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HENRY LESTER SMITH, Director

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BUREAU OF COÖPERATIVE RESEARCH
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Contents

PAGE

USE OF ACHIEVEMENT TESTS IN HIGH SCHOOLS. By Ernest J. Ashbaugh, Assistant Director of the Bureau of Educational Research, Ohio State University 3

SENIOR HIGH SCHOOL ENGLISH AS REVEALED BY A STANDARD TEST. By Ernest J. Ashbaugh 12

SENIOR HIGH SCHOOL ENGLISH AS REVEALED BY LETTERS. By Ernest J. Ashbaugh 19

THE CONSERVATION OF INTELLIGENCE IN HIGH SCHOOLS. By C. W. Odell, Assistant Director of the Bureau of Educational Research, University of Illinois 27

PROVIDING FOR INDIVIDUAL OPPORTUNITIES. By Hubert G. Childs, Professor of Secondary Education, Indiana University 38

HIGH SCHOOL SUMMER WORK IN INDIANA. By J. W. Jones, Indiana University 43

EMERSON SCHOOL STUDENT ORGANIZATION. By E. A. Spaulding, Principal of the Emerson School, Gary, Ind. 48

AN EXPERIMENT TO DETERMINE RELATIVE VALUES OF DIFFERENT TYPES OF ASSIGNMENTS IN A FIRST YEAR GEOMETRY CLASS. By Loren Chastain, Principal of High School, Liberty, Ind. 51

THE ADMINISTRATION OF ATHLETIC FUNDS IN INDIANA HIGH SCHOOLS. By Curtis D. Kirklin, Department of Education, Franklin College 57

THE SCOPE OF THE RESEARCH WORK IN THE ARSENAL TECHNICAL SCHOOLS (INDIANAPOLIS) WITH SOME EVIDENCES OF ITS VALUE. By Milo H. Stuart, Principal of the Arsenal Technical Schools 67

Use of Achievement Tests in High Schools

ERNEST J. ASHBAUGH

THE achievement testing in high schools up to the present time has been largely characterized by three things: first, by a paucity of carefully constructed tests adapted to high school use; second, by very infrequent use of the instruments which have been devised; and third, by nonuse of the results obtained in the few cases where tests have been given. This may sound like an exaggeration, but I am quite convinced it is true. Even tho one of the latest bibliographies of tests issued by the World Book Company, which confessedly does not list all devised, lists fifty-seven tests designed primarily for secondary schools and thirty-three more extending thru part of the elementary grades and one or more high school years, yet there are so many of these that will scarcely bear critical scrutiny that my initial statement is not challenged thereby.

The reason for the test movement progressing more rapidly in the elementary field is not hard to find. The elementary schools have long set themselves to the task of teaching a number of things to some degree of skill. The world has been convinced that children should learn to read and write and spell and do sums to such a degree of proficiency that even with the decreased exercise of these functions which occurs in life outside of school, they shall still be operative by all on demand. It is true that for a long while we made no attempt to define how well the child should read, how well he should write, etc. It is also true that we knew little or nothing of the degree of overlearning necessary in order that a usable residue would remain. But we were sure that reading was being taught in order that the child should be able to read both now and henceforth thruout life. We were sure the same thing was true regarding writing and spelling and fundamentals of arithmetic. There was but one primary object contended for and that was that there should be skill in the use of these tools of knowledge. We did not know what "skill" was or what degree of skill was needed or advisable, but we did agree that skill was the primary desirable goal. Therefore when the idea of tests originated it was most natural that the elementary field should have attracted the first and greatest attention.

Not only so, but to the extent that there is almost universal agreement regarding the material to be taught, the subject-matter to be included in the tests is well determined. Once the subject-matter is determined in terms of factual material or objective form, then the problem of devising tests embodying these facts and providing for measurement of ability or skill was relatively simple when the technique of test construction had been worked out. But where there was little or no agreement as to subject-matter which could be placed in the definite skill or

informational class, there little has been accomplished in the devising of tests. This latter condition has held true in the secondary field to a far greater extent than in the elementary. One may question whether there are any facts or skills taught in the secondary schools about which there is anything like the assurance that they must be learned so well that tho one live even beyond the threescore and ten, they will not have been forgotten. What, for example, will compare with the fundamental reading vocabulary, or the spelling of common words, or the multiplication table or legible handwriting? Is there anything in secondary English or mathematics or history or science the lack of skill in which or knowledge of which is as significant? We will probably concede that the acquisition of facts or skills is not the most fundamental function of the secondary school.

If you grant the preceding statements, then your judgment concerning the value or use or both of the achievement tests which deal with skills and facts must be colored thereby. If such skills as spelling of common words and legible writing and fundamental operations in arithmetic are to be used thruout life, then the learning process must be carried to the place where even with lesser use or even disuse for some interval of time the skill will not cease to function or the information be forgotten beyond recall. If, on the other hand, the material to be learned is for temporary use while developing a power or a method, then the learning process should not be carried farther than to insure the most economical functioning during the transition period.

This distinction is quite easily stated, but there would probably be great difficulty in all of us reaching an agreement concerning the specific items which should belong in the first category and which in the second. Perhaps we could agree that the climactic point in the dramas we study, the statement of plot in the novels, the formulae in science, the dates in history, a part at least of the vocabulary in language belong to the group of things which do not carry lifelong importance for all the children in the class. If anyone cares to object to the placing of these things in this classification, I will only suggest that he call to mind other things which he will be satisfied to have so classified and substitute them for the ones I have named for this part of the discussion. I am concerned with a general principle here and not with the particular items which may come under the principle. I referred to these items only in order to make more concrete in our thinking the thing I have in mind.

Blackstone's Stenographic Tests, Rugg's Scale for Measuring Free-Hand Lettering, Starch's and Henmon's Latin Vocabulary Tests, and others represent the tests or scales for measuring specific skills. They are quite comparable to Courtis Series B, Ayres Spelling and Writing Scales, etc. But the high school is fundamentally interested in something more or something different from acquisition of skill on such a basis. Our theory of secondary education, forced doubtless by the growth of the spirit of democracy and development of the consciousness of responsibilities of citizenship, interprets the function of the high school as something other than four more years in which to develop skills and acquire facts. The proponents of every subject have been

forced to present arguments in behalf of the subject showing reason for its existence. In theory at least, our teachers do not teach algebra simply for the sake of the children acquiring a knowledge of algebra; they do not teach science, language, and history simply in order that the children may *know* so much science, language, and history. I say in theory, these subjects are taught in order to give children power, develop character, train for citizenship, prepare for life.

Now manifestly a test which measures the rate and accuracy with which a child can work a certain type of example in algebra measures that thing and that only. If skill in manipulating certain types *should* be acquired, then there are excellent reasons why the degree of skill acquired should be ascertained. But it is futile to assume that such measurement of such a skill will tell us anything other than the degree of skill attained in this particular type of work measured. The same thing is true of similar tests in any subject whether in high school, grades, or elsewhere.

As curricula are built and subject-matter organized now there is doubtless a considerable amount of material which will lend itself to measurement in terms of skill or power. Whatever may be the organization in the future, there will probably continue to be such material, and measurement is but a surer means to the desired end of guaranteeing that this material is well taught and really learned. But measurement in secondary schools should learn some lessons from the voluminous work which has been done in the elementary field.

Early measurement or use of tests in the elementary grades was largely done thru curiosity, and it must be said that much has not yet progressed beyond that stage. Someone learned of a test, a copy more or less accidentally fell into his hands, and he proceeded to give it to a group of pupils. Often the papers were not even scored, or if scored the class average and extremes were noted and results compared with subjective judgment. If the two agreed, the attitude was often that the test told us nothing we didn't already know. If the two disagreed, the test was considered worthless because we knew better.

Gradually users of tests began to accept the validity of the tests and compare local results with state or national norms, with a resulting feeling of satisfaction if the results were equal to or above norm and dissatisfaction if below. This stage was also characterized by the wildest sort of general conclusions, often reached on the basis of a simple test of a few children.

Then followed the recognition by the most careful workers of what has become a maxim,—that a test tests what it tests under the given conditions; that an analysis of test results should exhibit some evidence of the weak points in the child's educational development, and perhaps suggest something of what is needed for remedy.

When the users of tests arrived at this point in their thinking, tests were subjected to an additional requirement, namely that they be diagnostic. Because many of the old tests were not and could not be diagnostic instruments, new tests were devised to render this service. Most of the older English tests, devised to measure progress thru elemen-

tary grades and high school, were of this character. The Kansas and Monroe Reading Tests, Starch's entire series, and others are largely deficient in diagnostic properties. By their use the teacher or principal may learn what children measure above or below norm in the particular field tested (and I do not mean the entire field of the subject since none of these tests even claims to test all of the field in which it lies), but he will gain little knowledge of what kind of remedial work to apply or where to apply it. On the other hand, Barr's and Van Wagenen's History and Minnich's Geometry represent tests in the secondary field whose authors have definitely, and to some degree successfully, attacked the problem of analyzing the situation and devising instruments which will be specifically helpful to the teacher.

In studying the tests for the secondary field and the current literature on the subject, I have been deeply impressed by the failure in this particular line. I find almost nothing telling specifically how to remedy the unsatisfactory conditions revealed. This may be due to an assumption that high school teachers, because of their superior training, need only to be made aware that an unsatisfactory condition exists in order for them to apply the right remedy. The assumption may be true, but I would not wish to vouch for it. It may be that writers on the use of achievement tests in secondary schools themselves do not know what to do when such a situation is revealed. Well, neither did workers in the elementary field when they first encountered the test revelations, but careful thoughtful experimentation has discovered remedies and gone far in developing a technique of remedial instruction. Is it too much to hope that the same development may take place in the secondary field?

P. T. Kepner in an article in the April, 1923, issue of the *Journal of Educational Research* has analyzed critically the test situation in secondary history. To a great extent his findings and conclusions apply equally well to the whole field of secondary subjects. In substance he says: (1) that the purely informational type of test fails to take cognizance of the newer trend in the teaching of the subject; (2) that the preparation of a test acceptable to the greatest number has not as yet been possible because of a decided lack of uniformity of opinion as to what constitutes the proper content, aims, values, etc.; and (3) that the tests cannot be given until the close of the year. Permit me to take up these points one at a time since they seem to deserve some comment in terms of the whole secondary testing field.

In most, if not all (I personally believe all), subjects of our high school curricula there has been developing a strong tendency to shift emphasis from the informational, factual side to the thinking, reasoning, application side. Not how many facts can be recited but what use can be made of the facts learned. Not how accurately the student can reproduce what was given in the text but what ability has the student developed to judge, to appreciate, to apply his knowledge and his habits of thought to life situations. Certainly the teacher who is not teaching his subject-matter at the present time from the latter viewpoint instead of the former has not kept alive to the pedagogical thinking in his own field regardless of what that field may be. This is the

challenge for those who would construct tests. Let them place a premium on ability to apply and not on ability simply to reproduce. Barr and Van Wagenen have accomplished much in the field of history. Here and there some progress has been made by others in other fields. Because it is more difficult to devise tests which will measure ability to judge, to appreciate, to apply knowledge than tests of skill or information is no reason at all why it should not be done.

The lack of agreement as to aims and values in the content subjects is largely due to the conflict of two views which may be stated as the view from the standpoint of the subject itself and from the standpoint of society and social institutions. History has developed into an organized body of knowledge which the trained historian seems to be interested in maintaining and passing on to posterity as an entity because of itself. Mathematics seems to be organized from the standpoint of mathematics, physics from the standpoint of physics, chemistry from the standpoint of chemistry, etc. These subjects have a long and glorious history as entities, with ever-increasing boundaries due to research and ever more and more absorbing to their devotees wholly aside from anything else. He who is building a curriculum or devising a test and is evaluating what shall go therein from the social utility standpoint is quite likely to step hard on some part of the logical organization of the subject as built by the subject specialist. This is the conflict inevitable and I want to postpone my comment thereon for a few moments. But that conflict need not deter the maker nor user of tests. Let each side prepare, according to the best technique which has been developed for test construction, tests according to the standpoint advocated, and let principals and teachers select from between the two. A conscious effort to measure results from either standpoint is far preferable to resting supinely upon personal opinion and subjective judgment.

And let me state here, parenthetically as it were, that there is no law in any state so far as I know which says that all tests must be devised on a college campus, that teachers and principals at work in the field may not construct measuring instruments. I think I may state further that practically every college and university has faculty members who will gladly offer constructive criticism of your work and guide you in such endeavor if you wish such help. You need not be personally acquainted to get such service. Having gone as far as you feel you can without guidance or assistance, send it in to any of our institutions addressed to the dean or head of the department of education or the bureau of educational research and see if we will not meet you gladly in cooperation.

The third conclusion reached by Mr. Kepner was that tests have tended to cover the entire field or year's work and could not be given until the close of the year, until it was too late for the teacher and student to profit by the revelation. This is almost universally true. Camp's tests in Physics, David's tests of Colonial Period in United States History illustrate the few efforts which have been made to correct this defect. As an aid in supervision and teaching, there is a distinct need for tests covering intensively smaller units of the subject-matter,

thus enabling the teacher to ascertain growth during shorter intervals than one year or even one semester and to discover weaknesses while there is still time to apply remedial measures.

Even tho in many of our high schools, class groups have been made more homogeneous in capacity for scholastic achievement thru grouping on basis of similiarity of intelligence scores or I.Q.'s, there will probably still be in nearly all classes a sufficient spread of ability or difference in educational attainment to assure irregular progress on the part of the various members of each group. Hence, such tests, designed to measure progress at frequent intervals, might quite conceivably be employed to further differentiate the members of the class and thus make possible a rational form of individualization of the rate of progress.

I wonder at times if high school people are interested at all in the implication of that statement. In the elementary field individual differences in ability and rate of progress are being seriously considered, and some efforts being made toward adjustment to these facts. High school classes are now frequently being organized on the basis of mental tests, and occasionally someone attempts to place his marking system on an objective basis so it shall designate different quantities of work done or different degrees of ability attained. But I know of almost no effort being put forth to adjust the administration of our schools to this very manifest difference in our children. Of course, I know that each of you will tell me that every teacher is constantly making that adjustment; that she is lightening the requirement for the weak or slow or dull and increasing it for the strong or rapid or bright; that this matter of individual differences is taken care of in the individual assignments. I grant that many teachers, not all, attempt something in this line, but I also maintain that in so far as our school organization or class conduct is concerned in a vast number of our schools the members of a class are as tightly bound together to a common pace as the members of a chain gang. What opportunity or inducement has the brilliant student in your algebra or geometry class to solve more than the regular assignment? What opportunity or inducement in your Latin class to read more than four books of Caesar or six orations of Cicero? Opportunity perhaps outside of school but what inducement? What opportunity or inducement in your science class to demonstrate that he has grasped the fundamental principle, has made its application, has this as working equipment now and then to plunge on at his own rate in the exploration of new fields of science? If any of you have made such provisions, write up your method clearly and concisely so the rest of us could follow it and submit it to the editor of any of our educational journals. I believe it would be accepted for publication, and I know the rest of us would like to hear about it.

Let me grant, for a few moments, only, that the subject-content of our secondary schools is what it ought to be. In spite of variation from school to school there is a great amount of similarity in the curricula of different schools. Those who study algebra in any school learn much that is common with that learned by the students in any other school. The same is true in every other subject. Should we not insist upon

the derivation of tests, if none now available are satisfactory, which will enable us to know not simply whether this class is doing as well as, better, or poorer than other classes this teacher has had and remembers more or less accurately, but also as well as, better, or poorer than the central tendency of classes elsewhere? Should we not conscientiously devote part of our time to ascertaining specific accomplishment at frequent intervals and then thru experimentation, work out the technique of remedial instruction? Not only so, but shall we not work out a means by which individual differences may be cared for more adequately than at present?

However skilful a teacher and extended her experiences, it is not too much to suppose that the sum total of the experiences of successful teachers would have something to contribute to her efficiency. The best tests available even tho imperfect probably will reveal class conditions more accurately than the teacher's subjective judgment alone. Giving these tests is not instruction and cannot supersede efficient instruction but should be a means to the desired end—efficient instruction. An adequate knowledge of status, of what has been accomplished when coupled with definite knowledge of the goals to be reached, is a greater guarantee of success than fine technique expending itself without this knowledge. Up to the present time the achievement test is the best instrument devised to reveal this status, and we should be using them far more than we have.

Some time ago I sent out a questionnaire to a random selection of high-school principals all over the United States. On the basis of a 50 per cent return it seems that fully half our high schools in cities of 5,000 and above have used no tests of any kind. The other 50 per cent have given one or more intelligence tests, and 25 per cent have given one or more achievement tests. Of those having given achievement tests at all, 48 per cent had given tests in arithmetic, 44 per cent each in algebra and Latin, 40 per cent in reading, and 28 per cent in grammar. French, history, chemistry, and spelling were the only other subjects mentioned by more than 5 per cent of the principals replying. The order of frequency of test used in the various subjects was as follows: in arithmetic, used mostly in commercial and teacher-training classes, Monroe, Woody, Woody-McCall, and Courtis, with Stone and Buckingham mentioned once each; in algebra, Hotz, Rugg and Clark, Douglass, and Stromquist; in reading, Monroe, Thorndike-McCall, and Burgess; in grammar, Charters, Purdue English form, and Clapp; in Latin, Henmon and the Classical League Investigation tests; in French, Henmon and Handschin. In no other subject did any single test have a frequency of more than one.

Few principals responded to my request for information concerning the use made of these tests. Those that did designated three uses: comparison of achievement of local pupils in comparison with general norms, a check on efficiency of the teachers, and a substitute for final examinations. I am disregarding here, of course, such answers as: "The Lord knows" and "To accommodate the university" which were received in three or four cases only. Of course, the Lord knows, and the university

faculty and graduate students must be accommodated. Standardization of tests can be accomplished only by coöperative endeavor, but if testing is to be done at all, it should be done for more reasons than these. Even a new test which we are helping standardize should teach us something because of the thought that has been given to its construction. When tests are given for general comparative purposes, of course they must be well standardized in order that the norms may be valid for this purpose. Tests available thru commercial firms usually satisfy this condition. If tests are to be used in checking efficiency of the teachers, precautions should certainly be taken to guarantee that mentality of pupils, previous training, and teaching and learning conditions are as nearly normal as possible. Otherwise one will not know whether below norm results are due to inefficient teaching or conditions over which the teacher has no control. Teaching efficiency can be measured more satisfactorily by difference between scores on same test or equivalent tests at beginning and end of teaching period than by relation of final test to general norm. As a substitute for final examination, the achievement test might well have a definite place providing it tests what *should be gained* by the time spent on the subject. If there are goals to be attained thru the study of this subject, then manifestly if we have final exams they should test the extent to which these goals have been attained. A test which tests vocabularly only, however good it may be as a test of vocabulary, could hardly be considered sufficient to test the goals of language study. The same statement would of course be true of a similar test in any subject, a test which measures one specific phase of the subject only.

In conclusion, I wish to submit another proposition for your consideration. Haven't we been concerned with teaching subject-matter to children long enough? Isn't it time that we were giving our attention to the teaching of the children? Teaching them what? Subject-matter? No. Teaching them by means of subject-matter partly, no doubt, but teaching them to attain such objectives as those set forth in the Cardinal Principles a few years ago. We have spent a lot of time endeavoring to show how the subject bequeathed to us by tradition and organized by the subject specialist would just necessarily carry our students to these desired goals. Would it not be more in accordance with scientific procedure to analyze these goals until we know their component parts, determine what would be learning situations for each of these parts, and then search thruout the whole realm of human experience for the materials which can be cast into each of these learning situations to assist in their functioning?

Some time ago there came into my hands a copy of "The Illinois Educational Objectives" as adopted by the Illinois High School Conference at the University of Illinois. I have studied its diagrammatic representation of the relation of a high-school education to economic, political, and social life. I have read with great interest the analysis of the major objectives into units and most heartily indorse the work as a whole. It seems to me to be a start, and a good start at that, along the very lines suggested above. But it seems to me that the question of practical application is wrongly stated. Granted that these are the goals

of education, the question is not "which of these objectives are or should be attained in each subject of instruction" but "what is there in the subject of instruction which contributes to these objectives?" The fundamental ideas behind the two questions are diametrically opposite. The first assumes the fixity of the subject-matter of instruction, and the task is the location of the objectives, the attainment of which may be aided thereby. The second assumes the supremacy of the objectives, and the task becomes one of selection of those parts of subject-matter which will contribute to the attainment of these objectives. Which idea do you espouse?

I am sure that when we really *believe* that health is a primary objective in education we shall become concerned with knowing at frequent intervals what progress each of our boys and girls has made toward the health objectives which are not simply a state of non-sickness now but the building up of bodily resistance and health habits which shall conserve this resistance. We do not believe it is a primary objective now; we only give it intellectual assent. When we *believe* these objectives are primary in importance we shall organize our materials of instruction for that purpose and devise instruments by which to measure achievement in these lines. Do I hear someone say that college entrance requirements will not permit such reorganization? My answer is that primary objectives must eventually (why not now?) take precedence over all other considerations. If that be treason,—you know the rest of the quotation.

Which must come first, reorganization of the curriculum or the devising of tests to measure the progress toward these primary objectives? Perhaps they can best come together. Who will join me in an earnest effort, beginning now, to bring the tests into existence?

Senior High School English as Revealed by a Standard Test

ERNEST J. ASHBAUGH

ENGLISH is certainly a major subject in the school curriculum of today. It has always had a prominent place, and while the entrance of new subjects one after another has necessitated the frequent readjustment of time allotment, yet English has held its place as well as if not better than any other. In the elementary field the combined time given to reading, spelling, and language is more than one-third of the total time children spend in school during this period. A comparison of the time allotment studies of Holmes in 1914 and Ayers in 1923 shows that English received 47.5 per cent of the total recitation period a decade ago and 34.5 per cent at present. This is a heavy reduction, but other subjects have lost even more. Few high schools offer less than a full four years of English, and many indeed require that amount for graduation. A large proportion of the students entering our colleges present four units of English for admission even tho but three are required by many institutions.

A subject which has had such a long continuous place in the schoolroom would naturally be expected to have well-defined aims and goals. The period of crude experimentation, seeking to discover the contribution which the subject can and should make to the education of an individual, might be expected to be passed. One might expect the materials and methods of instruction to be well known and effectively applied. When one looks, however, for these characteristics, he is not altogether satisfied with his findings. The statement of aims or goals is usually vague or in such general terms as to be largely worthless for classroom use; the materials are diverse and poorly correlated and the method is uncertain.

English instructors are likely to be found in two opposing groups in respect to the above assertions; one group denies the truth of the statements, and the other admits their truth but offers good reasons for these conditions. The latter say that English is adjusting to a changing social order and therefore its aims and goals are not static; that its content is growing by leaps and bounds, and the live teacher is constantly selecting from the new and discarding from the old in order to best serve the aims of English instruction; that method is at best but an instrument to be used in the attainment of the goals and hence must vary with instructor and class. The argument sounds good, but the validity of the argument must be found in the results.

That the world moves admits of no denial, and the social order into which the children of today are to step will be different from that of

any preceding generation. But our faith in education says that it will not be so much different that the schools may not prepare in part at least for this new order. If English merits its time allotment, it must have a very large contribution to make in the education of our children. If it has a large contribution to make, its aims should be well defined, its objectives specific. Unless this be true, there is little reason to expect either teachers or pupils to see clearly the purpose in the instruction given. Without such understanding, ineffective instruction is almost inevitable.

On the language side, the aim has frequently been set forth as the development of ability to think clearly, speak concisely, and write accurately. One author says, "The main object of this book is to develop skill in correct and clear expression of ideas." Another says, "The purpose is to teach the child to express in correct, beautiful, and effective form the fruits of his own experience, imagination, and thought." Another expresses it briefly, "to fix correct English usage", and still another, "to fix the habit of correct and effective use of English". While one may recognize such thinking, speaking, and writing when it comes to his attention, yet most teachers are helpless in reaching these ends unless more definite, more specific elements are analyzed from this complex. Concise and accurate speaking and writing involve some wealth of vocabulary, and acquaintance with correct language forms, and some knowledge of sentence structure. Whether these are the most important objectives to be attained by English instruction may be open to debate, but few if any would contend that they are not of major importance.

For some years the educational leaders in Ohio have felt that many of those entering the teacher training institutions were either very poorly prepared by the elementary and secondary schools or the native endowment was of very low grade. Hence the State Department fostered a bill three years ago which provided for an entrance examination embodying both general ability tests and tests of academic subjects for those entering teacher-training institutions. As a matter of administrative convenience the tests are given shortly before the end of the school year to high-school seniors and such others as may care to present themselves. One of the tests selected by the committee for use in the examination of May, 1925, was the English Minimum Essentials Test by J. C. Tressler.

This test consists of seven parts as follows: (1) Grammatical Correctness, (2) Vocabulary, (3) Punctuation and Capitalization, (4) The Sentence and Its Parts, (5) Sentence Sense, (6) Inflection and Accent, (7) Spelling. This report is based on the papers of 310 persons who took this last examination. They were about equally distributed among the 17 counties of central Ohio and represented all types of high schools from the little village school of less than one hundred students to the cosmopolitan high schools of Columbus. There were 65 boys and 245 girls, ranging in age from 16 to 28 years. The modal age was 17 and the median just past 18, with these two ages comprising 73 per cent of the cases. There were 299 who were just completing their high-school course, 2 were juniors, and 9 had graduated from high school at some

previous time. There were 219 from village schools, that is, places of less than 5,000 population, while 91 were from cities of above that size. The papers failed to show any significant differences as between those from cities and those from smaller places.

The first test consists of twenty sentences, in each of which there is one spot at which two words or phrases are entered in parenthesis. One form is correct, the other incorrect, and the test reveals the extent to which the child recognizes the correct form when presented with an incorrect form in the same sentence. For example, "She looks (beautiful, beautifully) in a white dress." This was missed by 13 per cent of the group, "They told me that Johnston (had been, was) dead for fifteen years" was missed by 7 per cent; "Neither of the sentences (are, is) forceful" was missed by 59 per cent. These illustrate the type of test and present also the sentence showing least error and the one showing most error. Six of the twenty showed more than 50 per cent of error. These sentences were: "Neither of the sentences (are, is) forceful", "I like (that, those) kind of apples", "Jamison cared for the orphan as if he (was, were) the boy's father", "Give it to (whoever, whomever) comes to the door", "He has two to boss him now, his sister and (I, me)", and "Neither Charles nor his brother ate (his, their) breakfast this morning." Nine others were missed by from 25 to 50 per cent of these students. The median score was 6 points, meaning 13 right and 7 wrong.

An analysis of the test shows that the errors are due to failure to connect number of verb and subject, confusion of tense, difficulty with inflected pronouns, etc. Whether the grammatical reasons for the correct usage should be known or not may be open to debate, but many of us think that high-school seniors who expect to become teachers should have acquired a sufficient knowledge of correct form to enable them to pick right from wrong form when both are presented side by side. Even those who know well may make an error in oral speech when thoughts are crowding for utterance, but the conditions of this test emphasize careful discrimination on the basis of all the knowledge possessed.

Test No. 2 is a vocabulary test. There are fifteen sentences in each of which there is one key word which is underscored. Beneath each sentence are five other words or phrases, one of which is a fair if not exact synonym of the one underscored. The task of course is to select from the five the synonym for the underscored word. The first sentence of this test is: "I caught a glimpse of the *azure* sky." The word "azure" is underscored and the sentence is followed by the following words and phrases: "gray", "dark and stormy", "clear blue", "bright", "fiery red".

This proved to be one of the easiest of all the sentences in this test, but it was missed by 17 per cent of the group. Twenty-one of the 310 thought "azure" meant "gray"; 14 thought it meant "bright"; 11 thought it meant "fiery red"; and 7 thought it meant "dark and stormy".

The easiest sentence was as follows: "In the trees I saw a *cardinal*." The word "cardinal" was underscored and the sentence followed by: "red bird", "blue bird", "song sparrow", "owl", "woodpecker". Altho all

these birds are very common in central Ohio, 19 thought a cardinal was a blue bird, 8 each thought it to be a song sparrow and a woodpecker, and 2 thought it to be an owl. Hence 12 per cent of the group showed their ignorance of these common birds.

I may not take time to discuss all the fifteen sentences in detail. I will give the list of key words and you may judge for yourselves whether a state is justified in expecting a high-school graduate who wishes to enter a teacher-training institution to know half or more of them. The key words beside those already given in the two illustrative sentences were "frankly", "frivolous", "vital", "inevitable", "perchance", "dale", "tawny", "hoar", "oblivion", "auspicious", "bland", "indigenous", "obsequious".

I have already stated that for each key word there were given five words or phrases, one of which in each case was correct. It is significant that each of the four incorrect words under each sentence was designated one or more times as the synonym of the key word. Five of these sentences were missed by more than 50 per cent of the group and 7 others by from 25 to 50 per cent. The median score was 8, 3 persons making perfect scores and 1 missing every word but "perchance". One wonders if that was not a mere accident.

It is true that one may express himself clearly, concisely, and effectively on many topics without using either of these key words, yet they can scarcely be considered so unusual that one may be expected to pass thru high school, thru twelve years of effective English instruction, and yet have made so little acquaintance with them that he cannot find a synonym present among the words given in the test. One of these key words, "frankly", is found among the 5,000 most used words in our language, and five others fall easily within the second 5,000.

Test No. 3 is on punctuation and capitalization, but I do not care to report results on this test at this time.

Test No. 4 is headed, "The Sentence and Its Parts". In two sentences the task is to designate the subject and the verb in each case. In another sentence, three words are underscored, and the part of speech of each is called for. Three other sentences are to be classified as simple, complex, or compound. This is definitely a test of technical grammar. Picking out subject and verb, giving parts of speech of designated words, and classifying sentences may not be considered exceptionally difficult grammatical requirements, but they are definitely outside the field of pure language usage. One may be able to speak and write very well indeed without knowing these things, but most textbooks present these phases of grammar, and one might easily expect the high-school graduate to know them.

The median score was 5 out of a possible 10. Four missed everything and 2 made perfect scores. Here again the facts of the situation can only be appreciated by an examination of the incorrect answers. For example, sentence one is:

"In one corner stood two artists discussing the pictures and statues."

What is the subject of the sentence? Two said "one corner"; 4, "discussing"; 8, "corner"; 3, "stood"; 5, "pictures"; 4, "statues", etc.

What is the verb? There were 113 who said "discussing"; 5, "pictures and statues"; 1, "corner"; 1, "artists". Surely the concepts *subjects* and *verb* are pretty hazy when such answers result. Twenty-two per cent missed the subject and 39 per cent missed the verb.

The sentence in which the part of speech of certain words is to be written is as follows:

"He said *that* the energy *which* drives our locomotives and forces our steamships *through* the waves comes from the sun."

What part of speech is the word "that"? You may have been taught that there are but 8 parts of speech, but listen to this list: pronoun, 76; adjective, 29; adverb, 28; relative pronoun, 19; preposition, 15; demonstrative pronoun, 9; verb, 5; explective, 3; indefinite pronoun, 2; participle, 2; noun, 1; infinitive, 1; demonstrative adjective, 1; interjection, 1; relative conjunction, 1; article, 1; object of verb, 1; past, 1. This is a total of 18 different wrong answers with a total of 63 per cent of the group. Thirty per cent were wrong on the part of speech of "which" and 31 per cent on the word "thru". Evidently the recognition of the function which a word plays in a sentence as indicated by ability to give its part of speech forms no certain part of the equipment which our children get from their English instruction thru the grades and high school.

The third part of this test, the classification of three sentences as simple, complex, or compound, admitted less variation of answer, tho one girl added to the category by declaring one sentence to be *convex*. The simple sentence was missed by 77 per cent of the group; the complex, by 63 per cent; and the compound, by 54 per cent. These figures need no comment.

Test No. 5 was designed to test sentence sense. One or more sentences or apparent sentences run on without punctuation are to be read, and the number of sentences in each group indicated by 0, 1, 2, or 3. The following examples are given to make clear the task to be performed:

1. Hoping that you received the goods in perfect order.
2. Do you know that Prosperine was goddess of the dead she never saw the sunshine.

Ten such groups of words are included in the test, and the consequent perfect score is 10 points. There were 17 persons who made this perfect score, 3 made one point only, and the median was 7. The easiest group was missed by 10 per cent and the hardest by 62 per cent. It is no wonder that the composition of these children shows choppy sentences, run-on sentences, and the like when their sentence sense is so poor that when set at the specific task of discriminating one sentence from another or discovering that the group of words is no sentence at all half the sentences are missed by a third or more of them.

Test No. 6 is headed, "Inflection and Accent". It consists of 10 items but asks for 3 different types of information. The first is verb form and each sentence will be presented. The first sentence is, "The dog.....his leg. Fill in the blank space with the past perfect active of *bite*." The following answers were given: bit, 112; has bit-

ten, 77; has bit, 9; had bit, 9; bite, 2; has broken, 2; was biting, 1; had been bitting, 1; is biting, 1; had been bitten, 1; bite-bit-bitten, 1; dog's, 1; bite the boy on, 1; has a bite on, 1. Total errors, 71 per cent of the group.

The second sentence is: "Tilden.....that he is a good sportsman. Fill blank with present perfect active of *show*." The results are: shows, 76; showed, 52; is showing, 26; will show, 6; has showed, 5; was showing, 3; thinks, 2; sees, 2; has been shown, 1; has been showing, 1; is being shown, 1; says to me, 1. This gives 57 per cent of error, and the forms show conclusively that the term "present perfect active" has really no meaning for a large proportion of this group.

The third sentence is: "During the night the paper ..... Fill the blank with the past passive of *tear*." Here again we have great diversity of answers with a total error of 35 per cent. The variety was as follows: tore, 68; had been torn, 15; has torn, 4; was tore, 4; had torn, 3; were torn 2; has been torn, 2; were tore, is torn, torn, was tearing, was torned, have been torn, has been tearing, will tear, tear-tore-torn, came, and papers', each 1. Evidently "past passive" also is a term of uncertain import in the minds of these young people.

The second part of this test dealt with the form of possessives. The possessive singular of "it" brought the answer, it's 112 times, its' 19 times, it 10 times, and 9 other varieties with a total per cent of error of 49.

The possessive plural of "turkey" gave us turkey's, turkeys, turkies, turkies' by large numbers, while turkie's, turkies's, turkeys's received 1 or 2 votes each. The total error was 53 per cent.

The possessive plural of "sheep" was sheep to 121, sheeps' 43, sheep' to 18, sheeps to 12, our sheep to 1, and of sheep to 1. Total error on this word was therefore 63 per cent.

The possessive plural of "editor-in-chief" was the worst of all, 86 per cent of these students failing to find the correct combination of *s* and apostrophe tho 18 different combinations were tried. You may figure out the possibilities with editor, editors, editor's, and editors' at one end of the word and chief, chiefs, chief', chief's, chiefs', chieve's, and chieves' at the other. One cannot help but wonder whether all of the 14 per cent getting the right form did it by positive knowledge or by mere luck.

Again let me say that one may raise the question as to the propriety of the test. Should one expect high-school seniors to know these language forms well enough to be able to distinguish correct from incorrect form when presented side by side in sentences? Should one expect young people of this age to know the meaning of the words given well enough to select approximate synonyms from groups of words containing synonym, antonym, and miscellaneous words? Should one expect knowledge of subject and verb, of parts of speech, and kind of sentence? Should these students at the end of their high school career be able to recognize a sentence when it is in front of them even tho it has neither capital letter at the beginning nor period at the end to separate it from other

sentences or groups of words? Should they be able to recognize that a group of words which has no finite verb is not a sentence? Should they be able to give correct verb forms on demand or spell correctly singular and plural possessives? The answer must be sought elsewhere than in these test papers for they say emphatically that one-third to one-half of these students cannot do these things.

Since they cannot do these things, we may well ask why. Is it because they have never been taught? Are these things not in the textbooks and the courses of study? If they are not, then it is no wonder the students cannot respond correctly. But if they are, then the responsibility for this inability lies at the doors of the schools. An examination of these sources finds them present. Our textbook-makers, while giving varying emphasis to these phases of English, all find place for them in their books. Our courses of study show the same status as the textbooks. The inference would seem to be, therefore, that we have not taught these things effectively. I think it is fair to say that we have not considered them of really prime importance. We are beginning to undertake, and to succeed fairly well, to teach the spelling of the most needed words so well that 90 per cent or more of the children will respond correctly whenever called upon. We have placed certain skills in arithmetic and certain facts in various fields of knowledge in this category. We have said that they are so important that we cannot afford to let any but the most inferior of our children leave school without knowing these things, without possessing these skills. These tests so far as this group of students are concerned would show that these abilities in English have not been so regarded. Whether they should be or not is left entirely to your judgment. Perhaps your students would make very high, perfect scores in these lines. Perhaps not. If you believe these things are truly important, it will be very much worth your while to see whether the results are being secured.

Senior High School English as Revealed by Letters

ERNEST J. ASHBAUGH

I presented yesterday at some length a report on the results of the Tressler Minimum Essentials English Test given to high-school seniors who wished to enter teacher-training institutions. The phases of that test presented involved vocabulary, sentence sense, and certain elements of technical grammar. Today I want to present further evidence on the English situation in a still more restricted field.

One of the phases of English composition which we present earliest is letter-writing. We attempt to motivate school work and influence the home favorably toward the school by having the children clear down to the kindergarten write letters at school to take home to their parents. We have them write invitations to their mothers to attend holiday programs, open house, Education Week activities, and parent-teacher meetings. In all of these we expect the teacher to give due attention to instruction in correct form, spelling, writing, neatness, etc.

In grade 3 or 4, we introduce a textbook, and, so far as I have examined, the first book of every language series gives some space to instruction in letter-writing. Successive grades supposedly give sufficient attention to the work to guarantee that that which has been learned is not forgotten.

And the various parts of a letter have been pretty well standardized. We do not expect to find the name of city and state of the writer on the line below the date, nor do we expect to find either or both these items in the upper left corner. Their position and order have been rather definitely fixed, and most of us prefer to find the heading in this position. The position and general form of the address and salutation have also been pretty well conventionalized. The body follows the same general rules of any theme writing. The laws of paragraphing, sentence structure, capitalization, and punctuation all apply in the same way. There is nothing strange or unusual and but few points of varying practice. Surely it would seem that the writing of a letter, a matter that has received teaching attention thruout many years without radical variation in style or rules, should be practiced by our high-school seniors with practically no error.

There is also another point to be considered. The letter is doubtless the one form of composition which will be practiced by any considerable number of our students after they leave school. Nearly everyone writes an occasional letter to home folks or friends regardless of his vocation or the extent of his education, providing only he can write. Furthermore, it is one of the things we are expected to learn in school

which may carry a heavy penalty if not properly performed. Our relatives and intimate friends may overlook our errors, but if we write a business letter or letter of application, the penalty is likely to be severe if we violate correct form, misspell our words, use incorrect language, or exhibit any other characteristics not on the approved list. Doubtless many of you know personally of letters of application which destroyed the applicant's chance for any further consideration.

When we know so well the possible price one of our students may pay for ignorance or carelessness in this line of work, it would seem that we would consider letter-writing among the most essential things to be taught in school. An examination of courses of study shows that the textbooks are closely followed in the presentation of this important item. It also indicates that the attention is heavily centered on this phase of English in the early grades with decreasing attention as we pass on. In fact, during the high-school years, we seem to have assumed that this part of our teaching process has been so well done that it is unnecessary to give it any attention at all. Perhaps the results revealed are due to forgetting. Perhaps it is due to the fact that elementary teachers, recognizing that the subject will be presented again and again in later grades, have not felt under any particular responsibility for guaranteeing the product in any particular grade. Whatever may be the cause, the data which I am about to present give some reason for thoughtful consideration of just what ought to be done in regard to letter-writing in our public-school course. If it cannot be so effectively taught during the elementary grades that it will carry thru high school without serious loss then it would seem that some attention should be given during the high-school English course.

The data which I shall report are taken from letters written by 200 high-school seniors, 35 boys and 165 girls, who were taking the entrance examination preparatory to entering teacher-training institutions. As one part of that examination, the following letters and instructions were presented:

Thomas Moore,
Superintendent of Schools

Phillip Sidney,
Assistant Superintendent

UTOPIA BOARD OF EDUCATION
716 Ambrose Building
Utopia, Ohio

May 8, 1925

Dear .....:

It occurs to me that you may be interested in a teaching position in the Utopia school system. I should like to have you write me, telling why you are interested in teaching or why you are not interested, if the latter should be the case. Please state what training qualifications you will be able to offer when you are ready to teach, and the salary you will expect. If you do not intend to teach, what do you plan to do next year?

Yours very truly,
THOMAS MOORE

Directions:—You are the person addressed in this letter. Please write a letter in answer, using the space below. Assume that Utopia is in your own county and answer the letter with that in mind. Write on the other side of this page, if you need the space.

Most tests are likely to vary widely from actual life situations. Those who conceived this as part of the entrance test rather prided themselves upon having found a situation which so closely paralleled the life condition which these young people might soon expect to encounter that the situation would seem natural and, therefore, call out the best that each individual could produce. Remember, these young people are nearly all definitely planning to enter teacher-training institutions for the purpose of teaching. In fact, all but 11 definitely stated so somewhere within their letters. One of the things which each one will be looking forward to during the coming year is the securing of a position, with its consequent letter of application or personal interview with a superintendent where there is a vacancy. They knew this letter was a part of a test of their qualifications for taking teacher-training work. The whole situation, therefore, lent itself to a revelation of information and attitude which could scarcely be improved upon.

An examination of these 200 letters from the standpoint of the mechanical characteristics shows some interesting facts. Of the 200 seniors who replied, 47 violated the well established convention regarding the heading. In many cases the heading was omitted entirely. However much Superintendent Moore might have been impressed by the body of the letter, he would have had to go to his own files to find the addresses of these individuals because they had not given them in the heading or elsewhere in their letters. It is easily conceivable that this might be a rather serious fact. A few placed the heading either at the extreme left or in the center of the page. While the centering of the address is frequent on printed stationery, it is not considered good form in a handwritten letter and in neither case do we expect to find the date in that position.

The error which involved the largest number of individuals and the greatest number of mistakes was misuse of the comma. Of this error, there were 275 cases by 136 or 68 per cent of the individuals. Of course, there is a great disagreement among English authorities as to the use of the comma. However, in scoring these papers the most conservative attitude was taken and only those errors indicated upon which there is practically no disagreement. For example, no one questions, so far as I know, that in the heading there should be a comma between the name of the city and the state. Another place where I think there is no disagreement as to the necessity for a comma is after the complimentary close. These two errors in the use of the comma made up a very large proportion of the total number. Occasionally someone slipped in a comma between the name of the month and the day of the month, a practice which I believe no authority would approve. These errors therefore fall definitely in the field where positive instruction could be easily given since usage is not variable in its demand.

The next most serious difficulty from the mechanical side was capitalization, which involved 182 errors by 104 persons. It is true that there is some difference among authorities on the question of capitalization. Again, however, in scoring these papers the most conservative attitude was taken. Only cases in which there could be no question regarding

the need for a capital letter were checked. So far as I know there is no disagreement in regard to the following points: (1) That all sentences should begin with a capital letter. (2) That all proper names should begin with a capital letter. These were the two types which failed to be capitalized on 182 occasions involving 52 per cent of all the letter-writers.

The third error in point of total cases, tho not of persons involved, was spelling. In the 200 letters which totaled about 20,000 running words there were 108 cases of error by 59 different pupils. The seriousness of this situation is not in the large number of words misspelled nor in the high percentage of misspelling. In fact the percentage of error as you no doubt calculated is less than 1 per cent. It is scarcely more than one-half of 1 per cent. It is probably complimentary rather than otherwise that 70½ per cent of these high-school seniors did not misspell a single word in their letters which averaged about 100 words each. It would hardly seem to uphold the assertion often made that all children graduating from high school cannot spell. Apparently more than two-thirds of them can write a business letter and spell correctly the words which they insist upon using. Of course, we do not know to what extent these children are acquainted with the words which they cannot spell correctly and which, therefore, they avoid trying to use. That there is something of this in the situation is shown by the spelling test section of the Tressler Test. Of the 15 words in this test, 8 are from the first 5,000 most frequently used words in correspondence vocabulary. Five of the 8 are among the first 2,000. The average accuracy of these high-school seniors on these 8 words of high social usage was only 75 per cent.

The seriousness of the misspelling with the 30 per cent who missed one or more words in their letters is in the words which they miss. Of the 71 different words missed one or more times, 6 were proper names, 3 of which were on the printed sheet before them. Of the others, 61 are among the 5,000 most frequently used words in correspondence vocabulary. Sixteen are among the first 500; 16 among the second 500; 16 among the second 1,000. Hence 48 of these words rank so high in social value that they should have been learned to perfection before the end of the elementary grades, probably before the end of the sixth grade. Among those of the highest value which were missed were: "taking", "truly", "getting", "because", "certain", "hoping", "beginning", etc.

The fourth error in point of total frequency (third in number of persons involved), was errors in paragraphing. Sixty-six of the 200 letters showed either paragraphing where it was not needed or lack of paragraphing where needed. The second condition involved almost the total number of cases. Apparently the idea that a paragraph represents a unit in a composition into which is placed the sentences expressing thoughts concerning a single theme or phase of the general subject is not very well understood by one-third of these high-school seniors. Perhaps we are to be congratulated that two-thirds of this representative group of young people did paragraph where they should. I believe you will agree with me, however, that if as many as one-third of our group

fails on a single item of importance, serious attention should be given to the situation. In spite of the fact that Mr. Moore's letter definitely asked for three separate things, namely, why you are interested in teaching, what training qualifications you will be able to offer, and the salary you expect, a considerable number of these letter-writers threw all the information into a single paragraph. Of course, some of the writers did not answer all three questions, but no paragraph error was checked up against an individual for failure to write a paragraph on a point asked for.

Another source of error was the use of the period. Here again we were exceedingly lenient in scoring the papers. Only failure to place a period at the end of a complete thought or after an abbreviation of first rank was counted. A considerable amount of leeway seems to be used in printing, at least with respect to a period after the name of the state in an address and after the signature at the close of the letter. Omissions in such cases were not counted. This error under the conditions stated appeared 44 times with 38 individuals.

Other errors such as the wrong use of words, for example, wrong tense, wrong number, adjective for adverb, etc., omission of question marks, omission of words, omission of quotation marks, wrong use of apostrophe, and repetition of individual words evidently due to carelessness, amounted to 42 errors by 40 individuals. The errors of question marks, quotation marks, and apostrophe were very few. The letters simply did not lend themselves to the use of these marks. Whether these children would recognize where to use them can best be answered from other data. The only data which I had at all comparable were again from the Tressler Minimum Essentials Test. Test three, which was not reported on yesterday, was a test of punctuation and capitalization. In this test are two sentences, one containing a direct quotation and the other an indirect. A tabulation of the first showed that of 200 papers, 115 showed quotation marks where they should be, and 85 showed no quotation marks. In other words, 57½ per cent correctly placed the quotation marks in this sentence and 42½ per cent failed. On sentence two, 128 let the indirect quotation go by without quotation marks while 72 placed quotation marks about it. In other words, 64 per cent were right and 36 per cent were wrong. These data present much more clearly whether these individuals knew the correct use of quotation marks than their letters of application in which this particular form of punctuation did not become an issue.

Doubtless some of you are feeling that there is something more important about a letter than these mechanical elements of form, spelling, punctuation, paragraphing, etc. I readily admit that there is another element of importance, namely, the content. I am not convinced, however, that content in a letter of this type can be expected to carry successfully serious errors of the other type. However, I want you to look with me at the content for a little while.

You will remember that there were three definite questions raised in the letter by Superintendent Moore: (1) Why you are interested

in teaching? (2) What training qualifications you will be able to offer? and (3) What salary will you expect? An examination of these letters for answers to these questions quite independent of the form of the answer revealed as follows: Only 128 or 64 per cent answered all three of the questions asked; 50 or 25 per cent answered two questions only. Of the 50, 39 answered the questions of interest and qualifications, omitting salary; 6 answered interest and salary but omitted the qualifications; 5 answered qualifications and salary but omitted the interest. Eleven answered but one question; 7 gave qualifications only; 4 gave interest only. Perhaps we should feel greatly pleased that no one of these 200 prospective teachers answered this letter in terms of salary only.

I think I will give you a bit of data on the reasons given for interest in teaching and the salary expected in order that they may give you some basis of judgment of the effect which the content of these letters might be expected to have upon Superintendent Moore. Fifty of the 200 gave the reason for interest as "desire to be associated with young people"; 47, "have always been interested in teaching"; 35, "would enjoy the work"; 13, "influence others to better living and to become better citizens". Numerous other scattered reasons, which would not well classify, were given. On the salary side, 94 expressed salary in terms of amount per month, and 27 in annual salary. The amount per month varied from $70 to $200, with a median of about $100. The annual varied from $800 to $2,400, with a median of $1,200. Six asked for the average salary, and 12 indicated that the salary fixed by the board would be satisfactory.

In closing I want to read to you four letters selected from this group. Number 1 represents probably the best in general form and content of the letter; Number 2, average; while Numbers 3 and 4 represent the lower extreme. I was quite unable to decide which was the worst.

No. 1

Mt. Gilead, Ohio
May, 9th, 1925

Thomas Moore,
Supt of Schools
Utopia, Ohio
Dear Sir:

I received your letter of the ninth and I wish to thank you for your consideration.

I am very much interested in teaching for I feel that it is the task for which I am best fitted.

After the completion of my training I shall have had two years Normal work at Bowling Green in addition to my high school course.

In return for my services I shall expect at least $130.000 (one hundred and thirty dollars)

Yours truly,
(Miss) Margaret Smith

No. 2

14 E. Kenyon St.,
Mt. Vernon, Ohio
May, 9, 1925.

Utopia Board Of Education
Superintendent of Schools
716 Ambrose Building
Utopia, Ohio.
Thomas Moore
Dear Sir

In reply to your letter concerning my interest in teaching in the Utopia school system, it is with pleasure that I answer with the statement that my ambition has always been to teach school. I like to work with boys and girls and will devote my time for their cause. I will be very glad to consider your proposition.

I will be a graduate of Taylor University, Upland, Indiana.

The salary depends upon what the other teachers get. At first I would be satisfied with a little lower wages than the other teachers, as it will be my first year of teaching and will be more of an experience for me. Please write and tell me the rates of other teachers wages.

Very truly yours,
Lutie E. Reeder

No. 3

May, 9, 1925.

Dear Sir:

I am writing to you asking you to secure if possible a place for me in your school. I have a resident of this county for several years. If need be I can get you a good recommend in my school about my grades and habuts. I intend to teach a few years and then go on to college and specalize. Please consider my letter as quickly as possible.

Yours very truly
Oliver Brooks.

No. 4

Columbus Ohio
May 9, 1925,

The Utopia School System
Franklin county.
Dear Sirs:

Having saw your advertizement in the paper of wanting prospictive school teachers to answer I am doing so.

I am interested in school teaching because it would be so interesting to have the children be around and know that they are learning, and getting an education that will help them out in future life.

I am expecting to specalize in History and civics. I expect to go to colege four years before I teach any.

With that amount of training I would expect a fair Salary of about two hundred dollars a month

Yours very Truly
Harold Moody

I have not presented these letters in any spirit of pride concerning the work of the high schools of the state of Ohio nor in the spirit of ridicule. I am presenting these data as a serious analysis of cer-

tain facts regarding the status of English usage on the part of high-school seniors in these communities. I believe that the points of issue raised are of fundamental importance in the preparation of our young people for life outside of school. If we are not now doing all that we could do in our English instruction and this presentation assists in bettering a situation, I shall be more than satisfied. If you know that such conditions do not exist in your schools, there is no suggestion that you modify your present practice. If similar conditions do exist in your schools, I leave the question with you as to what you may and should do about it.

The Conservation of Intelligence in High Schools

C. W. ODELL

ALTHO the problem of conserving human intelligence has attained prominence very recently and even now few persons realize its significance, it must be accorded an important place among the problems of today. This is true as it affects both education and other social activities. The conservation of material resources has been and is receiving a considerable amount of attention, much more than is being given to the problem discussed in this paper. The average individual is more concerned with his economic than with his intellectual welfare. The assertion has been made, however, that the actual economic loss due to our failure to develop and utilize the mental resources of our citizens to the best advantage is greater than that resulting from all our waste of material resources. I believe, therefore, that the conservation of human intelligence is one of the outstanding problems which our schools must attack.

There are at least two ways in which human intelligence is wasted. Waste occurs when an individual does not receive the educational training best suited to him, also when he does not enter the occupation in which he can succeed best and render the greatest service to society. The first is due largely to inadequate educational guidance, the second to inadequate vocational guidance. Waste of the first sort mentioned results when individuals lack sufficient capacity, that is, intelligence, to profit satisfactorily from the training received and also when the training given is not sufficient to develop their entire intellectual capacity.

The occupational service rendered society depends not only upon the training received, but also upon the relationship between ability, which, of course, has been affected by training, and the demands of the occupation entered. The latter may require ability in excess of that possessed, in which case one can probably render a greater service in an occupation requiring less ability. On the other hand, one fails to render his maximum service when the occupation entered requires less ability than he possesses. The waste in the latter case is also liable to be accentuated by dissatisfaction and loss of interest. Furthermore, the service rendered to society depends upon the social need for the occupation. This may be small because there are already too many trained workers or because the occupation does not yield large social returns.

Many of those interested in conserving human intelligence have asserted, and I am in accord with their assertion, that the largest

source of mental waste is due to our failure to discover and train appropriately those who possess superior intelligence and, after they have been appropriately trained, to guide them into suitable occupations. We give much attention to providing training and guidance for children of inferior intelligence. This is commendable, but such efforts yield much smaller social dividends than would the same amount of effort devoted to educating superior children. Both types of work, however, are important.

My primary purpose is to discuss the problem of conserving human intelligence as it applies to high-school seniors. Certain facts relative to their educational and vocational plans will be presented and some indication of the degree of waste given. This waste is due to, first, plans for educational training and vocational entrance not appropriate to the intelligence possessed by the person making them; and, second, the lack of agreement between the probable needs for workers and the vocational choices of the seniors. The fulfilment of this primary purpose naturally leads to the problem of how to reduce the present waste of intelligence. I shall, however, merely state the needs and refer very briefly to the means and methods which should be employed in educational and vocational guidance.

There are certain decided limitations upon the study of this problem. In the first place, the amount of waste cannot be determined with a high degree of accuracy. We cannot predict just how much society will profit from giving an individual a particular kind of training, or from having him enter a certain occupation. Also we cannot know in advance just how many workers will be needed in each occupation. There is, however, some evidence available on these points, and by the aid of this and the use of our best judgment we can hope to arrive at some conclusions.

Probably a more serious limitation is that the prognostic value of intelligence test scores is only fairly high. Even if the errors due to unreliability are neglected and the scores considered reliable, it cannot be assumed that they furnish a highly satisfactory basis of predicting success in either college work or an occupation. On the other hand, altho we know that many other factors besides mental ability play a part in determining success in college, the correlation between college success as measured by the marks received and the results of intelligence tests is probably higher than that with any other single item of information now available. The correlation between vocational success and intelligence test scores seems to be somewhat lower than that just referred to. A number of investigators have found positive, but not very high, correlation. It may be that proper educational and vocational guidance would increase the correlation.

The chief source of the data to be presented was a study of the high school seniors of Illinois. Reference will also be made to three other similar studies. One of these was carried on here in Indiana by Professor Book and others in 1918-19, at which time I was a high-school principal in this state and contributed data. It is described in Professor Book's volume, *The Intelligence of High School Seniors*. Another

was conducted in North Carolina by Trabue and others some three years ago. It is described in the *High School Journal* for January, 1924. The third was carried on about the same time in Massachusetts by Colvin and McPhail and is described in *Bureau of Education Bulletin* 9 for 1924.

The Illinois study was conducted in the fall of 1923. All of the four-year high schools were invited to participate, but only a few more than half did so. In all, 368 schools contributed data, and the number of seniors included was about 12,300. The schools participating were so distributed both as to sections of the state and sizes of the schools that they constituted an adequate sampling of all those in the state.

The seniors were given the Otis Self-Administering Test of Mental Ability, Higher Examination, Form A. Also each senior filled out an information blank which called for the following items:

Name
Sex
Date of birth
Age
Name of school
Town or city
Intentions concerning further education
  Intention of continuing or not
  Institution
  Course
  Major subject
  Vocational choice
Father's occupation
Information as to previous intelligence tests taken
Units of high-school credit
High-school subjects liked best
High-school subjects liked least
Number of failures in high school
Average school mark in high school

The last of these was obtained for only about 2,700 individuals, but the others were obtained for practically all those in the study.

It will, perhaps, be well at this point to say a few words about the other studies referred to. The one made here in Indiana was the first noteworthy investigation of this type. It included about 6,000 seniors and was, therefore, indicative of state-wide conditions. As in the Illinois study, each senior filled out a questionnaire which called for a dozen or more items of information. Several were almost or exactly the same as those used in our study and the others of the same general character.

The North Carolina study included somewhat less than 1,000 seniors who, however, constituted a large sampling of those in the state. A mental test was administered and a number of items of information of the same general character as in the Indiana and Illinois studies collected.

The Massachusetts investigation included 3,000 seniors who took an intelligence test and answered 16 questions very similar to those used in the other states.

The fact that the intelligence tests results are not highly reliable has already been referred to. Another source of errors is that the plan of the seniors cannot be depended upon as representing what they will actually do. Most of them were probably quite sincere in their answers, altho there is no doubt that some who were undecided, and perhaps others, gave the answers which they thought would sound best. A more important source of error is that many of them will change their minds. This will probably occur more often with reference to occupations than to higher education. It is not probable that these changes of mind will balance or offset each other. Undoubtedly more individuals will change from their present plans to less ambitious ones than will do the opposite. That is to say, the general tendency will be to secure less education than originally intended and to enter occupations that do not rank as high in social esteem or in opportunities of material returns as those first selected. I do not believe, however, that these changes will be great enough to invalidate the use of data as to college and vocational intentions, provided the conclusions reached are not based upon small numbers of cases or small differences, and not accepted without a reasonable degree of caution.

Taking up the problem in more detail, I shall first discuss the waste of human intelligence which results because some seniors of superior intelligence plan to secure no additional training, and others, of inferior intelligence, plan to pursue courses of training so long and difficult that successful completion is unlikely.

The institutions named by Illinois seniors were classified as follows: agriculture, commerce, education, engineering, law, liberal arts, library, medicine, military and physical training, music, and miscellaneous. In addition, some students indicated that they were undecided as to their educational plans and others did not expect to attend college, so 13 groups were formed on the basis of college intentions. The table* headed "College Intentions and I.Q.'s" shows certain facts concerning the relationship between the college intentions and the intelligence quotients of the Illinois seniors. The first line of this table, for example, shows that 260 boys expected to take college work in agriculture. Eight per cent of these had I.Q.'s below 90 and 25 per cent at 110 or above. The median I.Q. was 104. The half of the table on the right shows similar facts for the girls. It will be seen that there is a variation of from 3 to 9 in the per cents of boys whose I.Q.'s were below 90 and of from 21 to 42 of those at 110 or above. The median I.Q.'s range from 102 to 108. Among the girls the per cents below 90 range from 0 to 29 and those at 110 or above from 9 to 100. These extremes are rather unreliable, however, because of the small numbers of cases. The extreme medians are 96 and 125 and are also unreliable. Considering the various groups, we see that the boys planning to enter military and physical training and the girls entering commercial work and medical work rank rather low. The highest group among the boys are those planning to enter law, engineering, and liberal arts. The highest among the girls, leaving out two very small groups, is liberal

* Mr. Odell showed a number of tables and charts which are not reproduced here.

arts. From the standpoint of our problem, however, the most striking fact is that 6 per cent of the boys and 8 per cent of the girls who planned to attend college had I.Q.'s below 90 and that about one-fourth of the boys and one-fifth of the girls who were undecided or definitely intended not to go to college had I.Q.'s above 110. It is true that relatively more of those with I.Q.'s below 90 plan to secure less than four years of college training, but the difference is not very great.

In judging the probable degree of waste among the seniors included in the study, one must bear in mind that we do not possess information relative to health, interests, temperament, and other factors which condition success in college work and occupational activities. However, I believe that the evidence already presented indicates that the amount of waste is large. It is apparent that a large proportion of Illinois high school seniors of high intelligence will probably not be trained so that they can render maximum service to society and, furthermore, that a considerable proportion are planning to enter institutions of higher learning, altho it is very unlikely that they will be able to do anything approaching satisfactory work therein.

The data obtained in the three other states support the same conclusions. The Indiana study indicated that 17 per cent of the seniors planning not to attend college possessed intelligence high enough to leave little doubt of their being able to do successful work and, on the other hand, that 26 per cent of those expecting to attend could probably not do satisfactory work. Stating the facts in a different way, about one-fourth of those of high intelligence did not expect to go to college, whereas about two-thirds of those of low intelligence did expect to do so.

Turning to the North Carolina investigation, we find that 17 per cent of those in the highest quartile had not made up their minds to attend college, whereas 54 per cent of those in the lowest quartile planned to do so.

In the Massachusetts study, Colvin and MacPhail rated 15 per cent of those who planned not to continue their education as definitely good college risks.

We see, therefore, that altho the figures are not identical they reveal the same conditions in all four states.

In the absence of any explicit determination of the future social needs for trained workers in the various occupational fields and other necessary information, we cannot determine the amount of maladjustment between the supply of, and the demand for, workers, even if we assume that every high-school senior carries out his plans. A glance at the table already referred to* shows, however, that the kinds of training which seniors are planning to secure do not at all agree with the demands of society. For example, 1,221 boys out of a total of 3,475 were planning to take engineering courses, and 1,559 girls out of a total of 4,198 to take teacher-training courses. One does not need to compile a mass of data to know that there is no necessity for 1 boy out of every 3 being trained in engineering or more than 1 girl out of every 3 in teaching. Neither is it necessary that 1 boy out of every

10 or 11 receive medical training or 1 out of every 15 legal training. More attention will be given to this question later after the vocational plans of the seniors have been presented.

In connection with these plans two leading questions arise: first, how much waste results from the lack of agreement between the vocational choices of high-school seniors and society's probable needs for workers? and, second, how much results because some seniors of superior intelligence plan to enter vocations which will not afford opportunity for society to receive maximum occupational returns from their intelligence, and because others, who possess inferior intelligence, plan to enter vocations which require for success so high a degree of intelligence that they will, in all probability, be complete or partial failures therein? Only about 7,000 of the 12,000 Illinois seniors gave definite answers as to what vocation they were planning to enter, 1,500 more stated that they were undecided, and 3,500 gave no answer. It might be of interest to note, parenthetically, that almost 65 per cent of the girls gave definite answers, whereas only 55 per cent of the boys did so.

The vocational choices were classified under 14 headings. They differ from those used in the federal census in that the miscellaneous group included more occupations and that only four or five of the more common professions were listed separately, the others being grouped together. They were:

Clerical work
Engineering
Farming and forestry
Law
Medicine
Philanthropic work
Public entertainment
Publicity
Skilled manufacturing and mechanical work
Skilled transportation work
Teaching
Trade
Miscellaneous professions
Miscellaneous

The figure* entitled "Per Cents of Vocational Choices" shows the per cents of Illinois senior boys and girls falling in each group. Black represents boys; white, girls. Only those who gave definite answers are included, and the per cents given are per cents of this number. In this, black represents boys; white, girls. The table* headed "Per Cents of Seniors and Workers" likewise contains the same data in its first and third columns. Almost one-third of the boys named engineering, one-sixth trade, one-tenth teaching, and another tenth farming and forestry. Almost three-fifths of the girls chose teaching and almost one-fourth clerical work. Altho at least a few of each sex were included in every group, in half of them the per cents of girls were less than one, whereas there were only two in which this was true of the boys.

Probably your first thought is that these per cents would be different if the other 5,000 seniors had actually indicated vocational choices. I cannot, of course, state whether or not this is true. Undoubtedly, a large proportion of this group will enter vocations which require little specific training. For such vocations as engineering and medicine, one must pursue a rather long course of training and there-

* See note above.

fore a fairly early vocational decision is necessary. The one noteworthy exception to the statement just made is that many of the seniors who were planning to carry liberal arts courses did not name vocations. Such courses give most if not all the preparation required for teaching and are also frequently pursued as a preliminary to various professional courses. With the exception of this group I believe that the large majority of those who gave no definite answer will enter one of the following groups, in which most workers have little or no special training before entrance: clerical work, farming, skilled manufacturing and mechanical work, skilled transportation work, trade, and miscellaneous.

The classifications of vocational choices made in the other studies differ from that used in Illinois but nevertheless yield more or less comparable data. They show that more of the seniors included intended to enter engineering, teaching, and other vocations than will be needed to supply social demands.

I have already said that no data are available which show precisely what the needs of society are or what they will be. Neither does anyone know just what proportion of those engaged in any occupation should be high-school graduates. We know approximately how many individuals are now engaged in each occupation, but we do not know how nearly these numbers approach those best suited to society's needs nor how such needs will change. We frequently hear it said that, for example, we have more lawyers than we need and not enough farmers, but we do not know just how much the number of lawyers should be decreased or that of farmers increased. We know, furthermore, that in certain vocations the number of workers is increasing, in others decreasing, and in others remaining stable, and that these tendencies will, in many cases, probably continue for some time. We know, too, that there are many vocations which cannot be entered without at least a high-school education and that the present tendency is to increase this number.

Another point to be considered is whether or not it is desirable that the proportion of seniors entering a given occupation be no greater than the number of persons needed therein to meet society's demands.

It may be desirable to have more persons enter occupations which require a considerable amount of ability or in which the workers perform services of relatively high value to society. Such a condition makes competition keener and eliminates a number of the least fit, and thus may result in better service being rendered. On the other hand, the individuals eliminated have probably wasted a considerable portion of their lives and may fail to render society service of much value in any vocation, whereas if they had been properly trained and guided they could have done so. I do not believe, therefore, that the point of view just mentioned does justify the entry into any vocation of many more than the number of persons who should remain therein. It will always be necessary to put forth one's best efforts to attain high professional standing and large material rewards, and I believe that this spur to competition will be sufficient.

Altho there is no satisfactory criterion available with which to compare the proportions of seniors making various vocational choices in order to determine how well social needs will be met, some help can be obtained by making use of the census figures. The table* headed "Per Cents of Seniors and Workers" presents a comparison of the per cents of Illinois seniors with those of the total employed population of the United States eighteen or more years of age. The first and third columns show the per cents of the senior boys and girls, the second and fourth those of employed persons. Probably the most outstanding fact shown by these figures is that the proportions of high-school seniors choosing the so-called "white collar" occupations tend to be much greater than those of all employed persons engaged therein, and, conversely, the proportions of seniors choosing occupations requiring manual labor small in comparison with those already employed in such occupations. On the whole, there is no agreement between the per cents of seniors and of those already employed. Without going into detail it may be said that the per cents from North Carolina, Indiana, and Massachusetts likewise show no correlation with the census figures.

Altho it is impossible to state in even approximately exact quantitative terms the amount of waste resulting from the maladjustment of vocational choices to the needs of society, I believe that the data show a relatively great amount of such waste. Certainly at least one-fourth and perhaps as many as one-half of our high-school seniors will find it necessary to alter their vocational plans if the proportions engaged in various occupations are to agree with society's needs. In making this statement I realize that many of our workers are not high-school graduates and that from the ranks of these non-graduates will come most non-skilled workers. Parenthetically, the proportion of workers not receiving complete high-school education has been decreasing steadily and will probably continue to do so.

The table* and figure entitled "Vocational Choices and I.Q.'s" present facts concerning the vocational choices and intelligence quotients of the Illinois seniors. The table* is similar in form to that headed "College Intentions and I.Q.'s", that is, it shows the number of boys and girls in each vocational group, the per cents having I.Q.'s below 90 and at or above 110, and the medians. The figure shows in graphic form the middle 50 per cents, according to intelligence quotients, of the Illinois boys and girls in each vocational group. As before, the black surfaces represent the boys, the white ones the girls. The vertical line in each bar represents the median. The figure shows, for example, that the middle 50 per cent of the boys choosing law had I.Q.'s between about 101 and 118 with a median of 109.

Before we can determine how great is the waste resulting from the maladjustment between intellectual ability and vocational requirements, we must make some determination of the degree of intelligence required for success in each occupation or occupational group. Altho this question has received considerable attention recently, no valid evidence that covers any considerable portion of the field has been pre-

* See note above.

sented. The assertion has been made, and fairly well supported, that an I.Q. of 110 or 115 is required for success in most of the professions, that one of 80 or 85 is as high as is required by a street car motorman, and so on. Such assertions, even if accepted as reliable, usually apply only to large groups of vocations. Furthermore, the intelligence quotient cannot be determined with a sufficiently high degree of accuracy to warrant its use in any very exact fashion. In spite of these two, and perhaps other, limitations, certain general statements can be made with some assurance. All occupations may be thrown into a few large groups and the I.Q. necessary for success in each group determined approximately. It must be recognized, however, that the limits between occupational groups are only approximately exact and that there will be many individual exceptions.

A number of workers in this field have made statements much stronger and more definite than the preceding, basing them, in most cases, upon the army test data. However, great caution should be exercised in using these data to determine the optimum level of intelligence for various occupations. There is a tendency for individuals to find work suited to their capacities, but we cannot assume that all, or even a decided majority, of those engaged in most lines of work have exactly the most appropriate degree of intelligence. Neither do we know what proportion of the army recruits were successful in the occupations in which they were engaged. A comparison was made, however, between the I.Q.'s of the senior boys in seven of the occupational groups used in this study and the median letter ratings of army recruits who claimed to belong to these groups. Only seven groups were used because army results are not available for the others. This comparison showed a fairly high positive correlation. The philanthropic workers had the highest I.Q., 111, and the only A rating. Two of the army groups, the engineers and the medical workers, had B's. The former had a median I.Q. of 108, second to the philanthropic workers, whereas that of the latter was just about average. The lowest median letter rating was C, belonging to the farmers and foresters, whose I.Q. of 104 was next to the lowest. The clerical workers had the lowest I.Q. among the boys, 102, and an army rating of C+, or about average.

Even without any adequate information as to the degrees of intelligence required for success in various occupations, one can easily see that many seniors of inferior mental ability planned to enter vocations which require high degrees of intelligence, and vice versa. For example, 5 per cent of the boys who chose engineering, the same in law and in medicine, and 6 per cent in teaching had I.Q.'s below 90. On the other hand, more than one-fourth of those planning to be clerical workers, the same fraction in farming and forestry, and almost one-third of those who named skilled manufacturing and mechanical work had I.Q.'s of 110 or higher. Similar figures could be quoted for the girls. It is true that there is a tendency for the median I.Q.'s in the occupational groups supposed to require the highest intelligence to be high and in those requiring the least to be low, but the differences are comparatively small and the overlapping so great that the relationship between

intelligence and vocational choices is evidently slight. It is evident that a considerable amount of waste of both kinds does exist.

The results from the other three states show that much the same conditions exist as in Illinois. In almost all the occupational groups the range of intelligence is great. The various professions were chosen by a fairly large proportion of individuals of low intelligence, whereas in some of the other groups there were many possessing intelligence higher than necessary for success therein. For example, in Indiana 29 per cent of the boys and 21 per cent of the girls planning to become physicians possessed low intelligence, and 30 per cent of the boys in the clerical group had high intelligence.

As stated previously, the school marks of 2,700 of the Illinois seniors were secured. These were tabulated according to the vocational choices of the seniors. The results may be summarized briefly by saying that with the exception of two or three groups of girls in which the numbers of individuals were very small, they show no significant differences.

The waste found in this study may be briefly summarized as follows:

About 7 per cent of the seniors who planned to enter college had I.Q.'s below 90 and therefore practically no chance of succeeding in their college work.

More than 20 per cent of those who had not decided to continue their education had I.Q.'s of 110 or above and would almost certainly be successful in carrying college work.

From 25 to 50 per cent of the seniors will probably have to change their plans as to kinds of educational training and vocations to be entered in order to bring the numbers of workers in different occupations into agreement with the needs of society.

Five or 6 per cent of those planning to enter occupations calling for a high degree of intelligence have I.Q.'s below 90, and therefore have little chance of success therein.

From 25 to 30 per cent of those entering occupations which do not require a high degree of success have I.Q.'s of 110 or above, and are therefore wasting a portion of their ability.

In addition to these extreme groups we should remember that most of those having I.Q.'s between 90 and 100 cannot do successful work in college nor in certain vocations, whereas on the other hand many of those having I.Q.'s between 100 and 110 can succeed in college, but are not planning to attend, and can succeed in more difficult vocations than they have chosen.

As I said in the beginning of my talk, I do not intend to go into detail as to what the remedy is or as to how this waste of human intelligence can be reduced, if not eliminated. I wish, however, to make a few general suggestions dealing with this matter.

In the first place, I believe that all high-school students should be given at least one, and preferably two or three, group intelligence tests. Upon the basis of the results from these tests, their high-school records, the judgments of their teachers concerning them, and other pertinent

data, they should be advised concerning the continuation of their education. All who appear able to do satisfactory college work should be strongly advised to continue their training. The system of giving this advice should be such that not merely some one advisor but several, if not all, the teachers with whom each student has any considerable contact discuss the matter with him and offer him substantially the same advice. Frequently the matter should also be taken up with his parents. In short, strong pressure should be brought to bear to convince all concerned that seniors who can profit by further training should receive it and that those whose chances of success in college are very slight should not attempt to carry college work of the usual type.

The giving of vocational advice is more complicated than is dealing with educational plans. Such advice should be based upon the data referred to a moment ago and also upon other data concerning social needs, the individual's health, strength, and temperament; his past experience, his interests and opportunities for finding out something concerning various vocations, etc. We cannot at present, if indeed ever, expect to give vocational advice that is highly definite. Such advice as the following, however, may and should be given: "You appear to have sufficient intelligence to enable you to succeed in the following: ..... It is very unlikely that you can succeed in such occupations as..... Furthermore, it would probably be unwise for you to enter such occupations as....., because they do not afford an opportunity for you to make use of the degree of intelligence which you possess. Considering your mental characteristics other than intelligence it seems that you should be successful in....., but not in..... Your physical characteristics appear to be suited to.....and not to..... In short, you should enter the one of the following occupations toward which your interest leads you: ....." In other words, every high-school senior should have indicated to him a certain list of occupations or occupational groups in which all that is known about him makes it appear that he would be successful, others in which it seems that he would not be successful, and others in which he would probably waste some of his ability if he entered, and as strongly as possible advised to enter one in the first group.

Providing for Individual Opportunities

HUBERT G. CHILDS

THE psychological emphasis of the past twenty-five years and our compulsory attendance laws have both brought home forcibly to educators the importance of individual differences among youth attending our secondary schools, whether willingly or unwillingly.

So long as the pupil was free to attend school or quit, and so long as our ideal of secondary education was that its chief function was to select the most competent by eliminating the unfit, we were not much concerned with fitting the program to the child.

In popular thinking, education of secondary grade is becoming a necessity for all children, and in Indiana and certain other states this thought has been crystallized into law compelling all children to attend school to the age of sixteen. As a result of this enforced attendance, school administrators, teachers, and parents, as well as pupils, are becoming seriously concerned with the problem of adjustments of school work to pupil capacities and needs. The maladjusted pupil is a serious disciplinary problem in school and a probable menace to society in after-school years.

Psychological investigations and the development and administration of intelligence and school achievement tests have all made clear and emphasized the fact of individual differences. Every teacher, every parent, and every person having to do with children realizes the great differences existing among them in personality, in intelligence, and in interests. The questions we must raise as teachers and school administrators are: What are the differences of most significance? What are the causes of these differences? What is their significance for the educational program? Can they or should they be eliminated? What adjustments must be made in order that each child may receive that education to which his native endowments and peculiar interests entitle him?

A careful analysis of differences among individuals of the human race of significance for education will give some such result as the following as causes:

1. Biological heredity
   a. Physical
   b. Mental
2. Environment
   a. Social heredity (home and community influences)
   b. Systematic school education

3. Sex
   a. Hereditary differences of sex
   b. Differences between boys and girls due to differences in home and community standards and training for each sex
4. Maturity

Without taking time to elaborate on individual differences or their causes, I think I may assume that we are all agreed that such differences exist and form one of the major bases for individual needs. Another important basis for individual needs lies in the need of society that many kinds of occupational work be carried on. A third basis is found in the variety of interests relative to social, religious, and leisure-time activities. The total of individual needs is as great as the possible combinations of the various levels of intelligence with the various occupational interests of human society and with the varied social and leisure-time interests.

May I also assume that education in a democracy should guarantee to every child an opportunity to develop the talents he has to his and society's advantage? This does not mean the same education for all, but as great a variety in education as we have variety in talents and interests in children to be educated.

From the point of view of educational costs it will not be possible to provide school opportunities to satisfy every individual need, yet it is possible and desirable to provide for the major individual needs so far as they affect relatively large numbers of children considered in homogenous groups.

My concern this afternoon is to indicate briefly some of the more important plans or devices for adapting the educational program to individual or group needs. For the most part I shall treat of curricular adjustments only.

For many years all high schools have offered some elective courses and have thereby provided in some measure for individual differences in aptitudes and interests. Not infrequently such courses have been the determining factor in later college specialization or in shaping the decision for a life career.

In more recent years our larger high schools have come to offer several specialized curricula having special consideration for the future careers of young people. The scope of such offerings will vary with the size of the school. In schools of less than 150 pupils the best that can be done is to offer a general purpose curriculum only with a very limited range of electives. Such an offering has some exploratory value and meets the minimum college entrance requirements of the higher state institutions. Schools of this size seldom offer a worth-while specialized curriculum in agriculture, which is invariably the dominant industry in all communities having schools of this size. Larger city high schools offer many specialized curricula, as: college preparatory, commercial, agricultural, home arts, fine arts, and many varieties of industrial arts. The only way the boys and girls in rural and village communities can have access to a variety of educational offerings suited to their varied needs and interests is thru one or the other of the two following plans:

1. Thru a marked consolidation of our present over-numerous rural high schools so that we may have 200 or more pupils per high school, or,
2. Thru a perfectly free transfer law whereby any parent may demand of the trustee a transfer of his child to any high school offering the type of courses desired. With our improved roads and motor bus transportation, a consolidated school ten miles away is far more accessible than was the one-teacher district school of thirty years ago which may have been only one mile away.

Another means of providing for individual differences, that may be applied in any school, is to so organize the school that pupils of varying abilities may carry different loads of work. For example, pupils among the upper 25 per cent in scholarship in their class may be permitted to carry an extra unit of work, while pupils ranking among the lowest 10 per cent or 15 per cent may be restricted to three units. In any event the load should be proportioned to the pupil's ability to carry it successfully, and the extra work should not be assigned, as it so often is, to pupils who have demonstrated their unfitness for extra work by repeated failure with the normal load.

Schools which cannot afford to offer highly specialized types of industrial work may do much in providing individual adjustments by permitting certain types of outside work to be taken for school credit. For example, instrumental music. In all such cases, however, the school principal or superintendent should approve only competent instructors, should have some means of testing the progress of the pupil, should approve the arrangements for such work before its beginning, and the work should be closely related to some curricular offering of the school, in which department it should be credited. Promiscuous granting of high school credit for outside activities of trivial importance cannot be tolerated if substantial values be our goal.

Another means of recognizing individual capacities is to permit pupils among the more capable one-half in grades 7 and 8 to carry an extra subject from the next grade above. By this means a pupil by the end of grade 8 would have completed two units of high school credit which he would be permitted to count towards high-school graduation.

A third major means of providing for individual differences is that of organizing pupils into homogenous groups for purposes of instruction. This plan is feasible only in schools of large enrollment. Certain objections have been raised to this plan, particularly by parents having children in the slower moving classes, but on the whole the plan meets with approval when tried and it is coming into more general use. We may naturally expect to find the least competent people in society protesting against the greater advancement of those more favored by natural endowment. There is real danger in these days of superficial democracy that we choose the low standard which the least competent can attain as the standard for all. To do this is to do an educational injustice to those capable of attaining higher standards. With-

out doubt the work can be adapted to the needs of each class group far more effectively when grouped according to ability and past achievement than when mixed without regard to capacities. Segregation in classes for instruction need not lead to segregation in the general life of the school.

Some subjects naturally lend themselves to segregation of the sexes, for example, physical education, home arts, and many forms of industrial arts. There is some evidence to prove that certain courses in music, literature, and science could be better adapted to boy or girl groups than to mixed groups. In the whole realm of segregation, whether it be on the basis of ability or sex, there is need for much experimentation to determine the most appropriate organization or method of procedure for each segregated group. For example, should class size be the same in bright and dull classes, and shall the length of class period be the same for the two classes? Experiments, so far conducted, indicate that classes of dull children should be of smaller size than when composed of brighter children and the class period needs to be longer.

A fourth major group of plans provide for individual instruction or at least a large measure of individual instruction with a minimum of class instruction. Among these plans may be mentioned the Dalton plan, the Winnetka plan, the Pueblo plan, the University of Missouri plan, opportunity classes, special tutoring or coaching, the Springfield (Ill.) laboratory plan in mathematics, and various others of similar nature.

Among the other plans of this group I have chosen supervised study for special consideration.

Many educational writers and many principals of schools who have inaugurated a plan of supervised study speak as tho they had discovered a panacea for all our educational ills. Of late several writers who have critically evaluated the general and experimental literature on supervised study conclude that the claimed values of supervised study have not been demonstrated. Why use 60 or 70 minutes to produce 40 minutes' work unless we can demonstrate superior results? Here again is a field needing much careful experimentation. Some of our evidence shows that the more capable pupils are hindered in their progress by close supervision.

We need to determine what procedure (techniques) are best for each of our various ability groups; what length of period, what variations are to be made because of differences in subjects, and the like. It is not apparent to the speaker that we are yet ready to draw conclusions but rather we should seriously consider the beginnings of careful experimentation.

A fifth means, promotion by subject rather than by grade, has become universal practice in all high schools and in all grammar grades where departmental teaching prevails.

More frequent intervals for promotion, as 12 weeks instead of 18, would have much advantage for repeating pupils, and would seem to be a desirable possible adaptation.

Some of the larger high schools (almost none with enrollments below 250) are providing individual opportunities thru part-time, evening,

and summer classes. Summer work seems to have developed very rapidly during the past 4 or 5 years, partly to enable ambitious pupils to complete the high-school requirements for graduation in three years without carrying extra work during the regular year, but more often apparently, summer work has been developed to enable failing pupils to make up their deficiencies. This type of work has developed so recently that state departments of education have, as yet, taken little cognizance of it. There is evidence to show that in the majority of schools the same time element is not required for the completion of credit as during the regular school year. In some schools only one-half the time is required to earn a full credit, and in about one-half the schools two-thirds the regular time is required. Another feature of summer work that may be subject to much abuse is that very frequently teachers are paid entirely from pupil fees.

Mr. J. W. Jones, a graduate student at Indiana University, is making an intensive study of summer work in high schools and will probably have his report completed next summer.

I shall dwell briefly on a seventh plan before closing my remarks, namely that of varying the methods and requirements of the work to suit individual needs within a class. Under this plan many procedures may be classified, as provision for maximum and minimum subject requirements, purely individual supplementary assignments for certain pupils, variation in difficulty of questions to pupils of varying abilities, difference in quality of responses required from pupils of different abilities, difference in amount of help to be given by the teacher to pupils of varying abilities, and other like procedures.

Within a class group a teacher can adopt many procedures that will adapt the work in part to individual differences in capacity. Individual opportunities to secure work more suited to the needs of pupils can be secured in a measure in some cases by a more vital application of general principles to daily life, but more often this must be combined with a richer and more varied curriculum offering by the school.

The foregoing remarks constitute but a partial and imperfect survey of the possibilities of the field chosen for discussion.

In closing I desire to indicate two references, which, with their accompanying bibliographies, I think you will find helpful in studying this problem:

1. Smith, H. L. Plans for Saving Time in Grades 7-12 (Fifth Conference on Educational Measurements, Indiana University, 1918).
2. Year Book of the National Society for the Study of Education. Part II, 1925.

High School Summer Work in Indiana

J. W. JONES

ONE of the methods by which the high school has tried to broaden its service to the community has been in the organization of high school classes during the summer. This report is the result of an attempt to determine the extent of such work in Indiana,. and is presented in the form of the answers to specific problems.

First Problem

How extensively are summer schools conducted by the Indiana high schools?

There are 693 commissioned high schools in Indiana, based on the state directory for 1924-25. These 693 schools enroll in their regular session a total of 105,259 pupils. A preliminary questionnaire was sent to all schools in the state with an enrollment of over 150 pupils. Twenty-two of these schools reported that they had done some summer work; 19 reported doing summer work in the summer of 1925. The results show that summer work has not been undertaken by the smaller schools. The smallest school doing summer work had an enrollment for the year 1924-25 of 301 pupils, and was the only school reporting which was not a member of the North Central Association. Since 94.4 per cent of the schools enrolling more than 250 pupils reported, it seems that this report represents conditions in Indiana.

This past summer (1925) there were enrolled in the summer classes of our Indiana high schools 3,290 pupils. Enrollment in summer classes shows a gradual growth as indicated by Chart I, page 45, which shows the enrollment for the five years from 1921 to 1925 inclusive. This student body of 3,290 represents 12.69 per cent of the total regular session enrollment of the high schools conducting the summer work, and 3 per cent of the total high-school enrollment in the state for the school year of 1924-25. When one considers that these 19 schools enroll 24.65 per cent of the total high school enrollment during the regular session the figures become even more significant.

Second Problem

Who takes summer work? Are the courses designed to care for the flunkers of the regular sessions?

The schools were asked to report as to how many of the summer pupils had failed during the regular year and were taking work to make up this failure. Sixteen schools replied to this question. One reported that "about 40 per cent" were making up failures. Another said "less

than half", while a third reported "only a small per cent". In the 13 schools (enrollment 1,627 pupils) giving numerical replies, 22.25 per cent of the pupils had enrolled because of failures in the regular session. The most significant finding in regard to this problem was that the smaller schools enrolled a larger per cent of pupils who had failed than did the larger high schools.

Third Problem

How does the summer organization compare with the regular session organization in such matters as leadership, teachers, expenditures, etc.?

In 57 per cent of the schools doing summer work the principal is also the director of the summer session. The final authority for the organization of the summer work rests with the board of education, altho there is quite a diversity of sources responsible for the starting of the work. A few reported that the demand for a summer course first came from the students.

In 40 per cent of the schools the financial administration of the summer work is in the hands of the principal, who is responsible to the superintendent. In 30 per cent, the superintendent is in charge of financial affairs; in 15 per cent the teachers deal directly with students in financial affairs; and in 15 per cent, the board of education cares for the matter.

In 67 per cent of the cases reporting, tuition is charged for the summer work. Sixty per cent of the schools charging tuition have a flat rate of $10 per subject for the summer period. The lowest rate charged is $6 per subject, while the highest rate is $12 per subject. Thirty-three per cent of the schools run the summer work with a budget appropriation.

Teachers are selected from the regular staff and meet the license requirements of the state in every school reporting. The payment of teachers is divided among three plans. First, a contract is made between the teacher and the board of education as to a salary thru the principal or superintendent. Second, a certain per cent of the yearly salary is paid for work of the summer, there being no uniformity of practice in this matter. Third, and most common, is the plan of paying to the teacher the tuition collected. The mean salary paid in 1925 was $442.

The one outstanding feature of the summer work in which all schools agree is that the pupil be limited to two subjects. Only in exceptional cases is the pupil allowed to take more than two subjects, never more than three.

Fourth Problem

How does the quantity of work done in the summer compare with the work of the regular session?

While the reports show a very good practice in our commissioned high schools in so far as selection of teachers and certain plans of administration are concerned, there is a wide diversity of practice in the length of the summer term and the length of the recitation period, when measured by the requirements of the North Central Association.

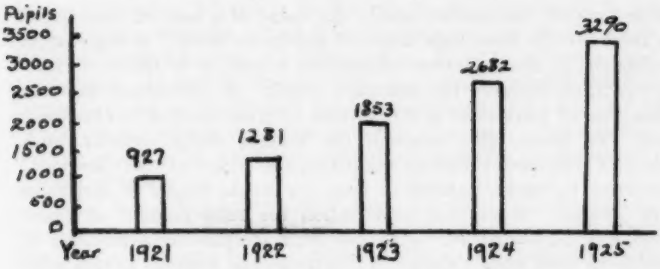

Chart I. Growth of enrollment in Indiana Summer High Schools.

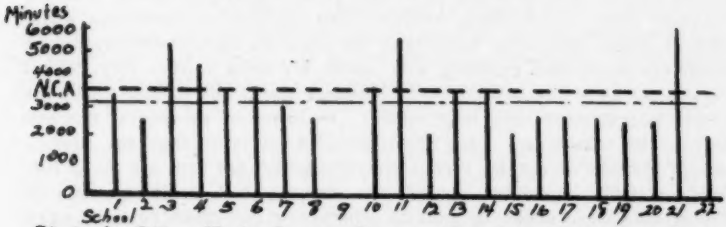

Chart II. Total number of minutes used for recitations. ---- The N.C.A. requirement for one credit. —·— Median

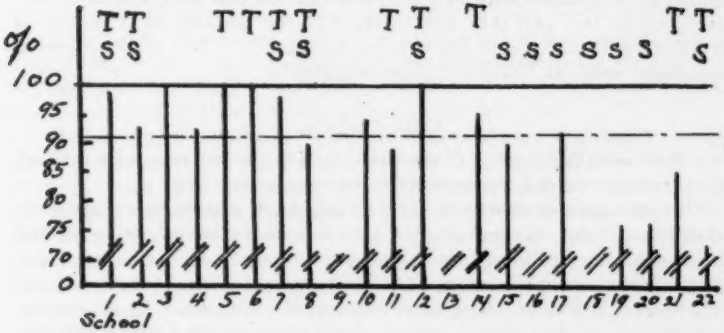

Chart III. Percentage of pupils to whom credit was granted. T - tuition was charged. S - short of the time requirement of the N.C.A. as indicated in Chart II. —·— Median

The North Central Association defines the value of a unit of high-school work in terms of 120 60-minute hours of classroom work. A high-school credit is defined as the equivalent of one-half a unit, or in terms of classroom work, 3,600 minutes per semester credit. A convenient measure of the quantity of work done is the amount of time devoted to classroom procedure. To secure this measure the schools doing summer work were asked to give certain factors regarding the length of their sessions: length of term in weeks, number of days per week, length of recitation period in minutes. From this information the total amount of classroom time was calculated and the result was accepted as a measure of the quantity of work done. Chart II illustrates the findings graphically, and if we accept the standard of the North Central Association as a fair criterion of a credit of high-school work, the findings of this study become significant. All schools gave one credit for the work represented. It will be noticed that 12 of the 21 schools reporting are doing less than the required work, 5 are doing exactly 3,600 minutes of classroom work, while 4 others are doing more than the required number of minutes of classroom work and granting one credit for such work. (Not all of the schools gave one full credit for summer work, but in such cases the proper adjustments have been made.) In terms of per cents, 42.8 per cent of the schools are doing the equivalent, or more than the equivalent, of a credit of regular term work; while 57.2 per cent are doing less than the required amount of work and granting full credit value for it. The schools were asked to indicate whether or not their summer work credit was accepted by the local high school, other high schools, the State Department, the State University, and the North Central Association, and in all cases the schools reported that the groups named accepted their summer work at par value. In one case only was there any exception to this and that was in reply to the question as it relates to the University and the North Central Association. This school reported that these agencies "have never investigated".

Fifth Problem

How does the quality of the work done in the summer, as measured by the credits earned, compare with the regular sessions?

In the summer work of our Indiana high schools there are over 30 different subjects taught. History leads in popularity, being offered in 13 schools, algebra I, plane geometry, and English follow in the order stated, while the range of subjects taught covers practically the entire secondary field. The total number of enrollments in all classes in 1925 was 3,777; of this number 3,207 were granted full credit for the work done. This means that 14.9 per cent of the total enrollments failed to make their credit. Of the 3,207 who were granted credit, 2,121, or 66 per cent, were enrolled in classes doing less than the required work as defined by the North Central Association. This is shown graphically in Chart III. The schools are arranged in the order of their regular session enrollment, the smallest at the left. The horizontal line indicates 100 per cent passes; the vertical lines indicate the per cent passed

in each school. "S" refers to the information illustrated in Chart II, and indicates that the school is conducting a class that is short of the North Central Association requirements. The "T" indicates that tuition is charged. It will be noticed that the smaller schools have issued a larger per cent of credit than the larger schools. The per cent of credit issued among schools charging tuition is also high. The question might well be raised as to whether or not this particular relationship is one of primary importance.

The foregoing figures have been for total enrollments and total credits issued in Indiana high schools for the summer of 1925. The question of quality might well be applied to the various subjects studied.

Thirty-three per cent of the schools doing summer work supplied the information necessary for the following study. The median percentage is used in each case for the report of the schools as to the per cents failed in the second semester of the school year 1924-25. The percentage failing in the summer school work is greater than in the regular session. Since almost one-fourth of the summer enrollment is made up of the flunkers of the regular session this condition seems to be due to the type of pupils enrolled in the summer.

Per Cent Failed

	All-Schools	Mathematics	History	English	Latin
Summer Schools....	14.9	20.0	13.0	20.0	22.0
Second Sem., 1924-25	9.98	13.12	8.93	9.72	10.48
Range Second Sem.	6.2–18.9	7.3–18.2	4–15.1	6.3–14.3	8–14.36

The median summer high school in Indiana during the summer of 1925 held recitations during 3,011 minutes; it allowed each of its 150 pupils to enroll in not more than two subjects; the school was under the direction of the regular high-school principal, and was taught by five regular high-school teachers, each of whom received $442 for the summer instruction. The pupils paid $10 per subject for summer instruction, and 85 per cent of them earned full credit for this work.

The study of conditions in Indiana points toward a growing enrollment in summer high-school work; the qualifications of the teachers are on a par with those of the regular sessions; the teachers are well paid for the amount of work done; the summer work undoubtedly fills a need, and may even be a forerunner of a broader use of the school plant; but at the same time, the study clearly indicates that there is need of improvement in the time standards; and a more careful consideration of the granting of credit for inferior work by the school, or the acceptance of this work by other school units.

Emerson School Student Organization

E. A. Spaulding

In 1912 Mr. R. D. Chadwick, who at that time was in charge of the social science studies in this school, suggested that the students be organized for more effective coöperation about the school.

As the teacher of history and civics, Mr. Chadwick was interested in having the students organized along lines as closely paralleling city and state organization as possible, thus forming a laboratory where students might get first-hand information on community problems.

Accordingly, since 1912 this school has had a school election in November of each year paralleling our city elections and following the Indiana election laws with definite party organization, voting precincts, and other political machinery.

At the election each year the following officers are elected to our student organization: the president, vice-president, boy yell leader, girl yell leader, senior boys' representative, senior girls' representative, junior boys' representative, junior girls' representative, sophomore boys' representative, sophomore girls' representative, freshman boys' representative, freshman girls' representative. This organization is called the Emerson board of control. Since each student votes for the president, vice-president, yell leaders, and the representatives for his or her class, it is necessary to print separate ballots for each of the high school classes.

The Emerson board of control has a constitution that defines its powers and authority. It has the right to bar students from all extra-curricular activities. The principal of the school has a right to veto any action of the board of control. During the thirteen years that the student government organization has been operating in the school, the principal has not found it necessary to use his power to veto.

The board of control does its work mainly thru five standing committees. These five committees are as follows: boosters' committee, eligibility committee, social committee, athletic finance committee, building and grounds committee.

There is no prescribed number of students for each of these committees with the exception of the eligibility committee, which always has a representative from each of the high school registers or sponsor rooms.

It is the practice of the board of control that the president, subject to the approval of the board, appoint a chairman for each of these committees, and the chairmen, together with the board of control, work out the personnel of the committees. Each committee has a faculty advisor. The faculty advisor is selected by the committee, and must be approved by the board of control.

The boosters' committee is charged with the responsibility of promoting all school activities in which the students and teachers are interested. They are responsible for the advertising and sale of tickets to all plays, concerts, athletic games, etc. given by the school.

The eligibility committee is charged with the responsibility of promoting good scholarship in the school. Each month this committee turns in to the principal's office a detailed report listing the name of every student in school who is ineligible and giving the exact reason for his or her ineligibility. The value of this committee is demonstrated by the fact that in the years it has been operating it has succeeded in reducing the percentage of ineligible students to less than one-third of what it was when the committee started its work.

The social committee is charged with the responsibility of administering the social program of the school and of promoting right social relations among the students. This committee supervises a matinee party after school twice each month. An admission of 10 cents is charged to these parties, and the money collected is sufficient to pay all the expenses and leave a balance at the end of the year. These matinee parties seem desirable to the school since they mean no expense for clothing and no late hours for the children, for these parties always close by 5:30 p.m.

The athletic finance committee is charged with the responsibility of collecting and checking the receipts at all athletic contests. This committee furnishes the ticket-sellers and door-keepers for all events under its charge.

The building and grounds committee may be compared to the police department of our city organization. This committee is charged with the responsibility of regulating students' behavior about the school so as to secure the maximum of comfort for all. It has charge of the traffic in the school corridors and reports to the board of control any students who need attention.

At one time several senior students violated some of the corridor rules of the building and grounds committee. These students were reported to the board of control by the building and grounds committee. The board of control disciplined these students by barring them from all extra-curricular activities. Unfortunately for the students disciplined, the senior party, which is their big social event of the year, was to be given in a few days. The students were so concerned that they and their parents appealed to the office to get the ruling of the board of control set aside. The office took the position that since the board had made the ruling, the parents and students would need to present their appeal to this board. It seemed that if they would be able to convince the board that their penalty was an unjust one, it would very likely alter its ruling. It was interesting to the office to note that these parents made no attempt to present their case to the board of control and that the ruling of the board stood, these students missing the senior party and the other students of the school gaining a new respect for the board of control.

The board of control meets every second week and hears the reports of the chairmen of the five standing committees. The chairmen of the committees attend all of the board of control meetings, having all the privileges of other members of the board of control except that of voting. The board of control frequently appoints other committees for tasks they wish to accomplish.

We feel that the fact that our board of control has been in successful operation for so many years is due mainly to two facts: First, it is given a reasonable amount of authority and allowed to use it without undue interference, and its committees have definite pieces of work that keep them busy year in and year out. Second, the faculty of the school makes no effort to use the student organization as a means of getting information on students. To accomplish this the faculty has this understanding with the board of control: that they may bring up for discussion the case of any student no matter of how serious a nature his offense may be and have no fear that the faculty will take the case out of their hands or act on it in any way if they get their first information thru the board of control. This understanding is important so that the students will feel free to discuss their own problems and also so that any student who is already in trouble with the faculty cannot escape a penalty by getting his case taken over by the board of control.

All of the members of the board of control feel perfectly free to bring up charges against individual students with no thought that they are tattling or getting the student into unnecessary trouble with the faculty. They regard these cases as their own problems. If they find they are unsuccessful in handling a particular problem they may turn it over to the faculty at their pleasure. It has been our experience that as soon as they find their measure ineffective with any student they are ready to turn the case over to the faculty.

To illustrate one of the values of the student organization, I am detailing the organization of our building and grounds committee. This committee appoints traffic monitors for the school corridors. These students have certain stations in the corridors and are responsible for the observance of the corridor rules. Two traffic monitors work at the same station, one of them changing at the end of each week so that for each station there is one student who has had a week's training for that particular position. He or she in turn trains the new monitor to his or her duties. Since monitors work for only two weeks and about thirty monitors are used at a time, in the course of a school year approximately six hundred boys and girls get an opportunity to carry this responsibility. It is our experience that two weeks as a traffic monitor converts a student's viewpoint from that of a casual student to that of a responsible member of the community in so far as matters of school discipline are concerned. One of the best things to do for the student who is troublesome about the school corridors is to appoint him as a monitor so that he may have contact with the other side of the problem.

An Experiment to Determine Relative Values of Different Types of Assignments in a First-Year Geometry Class

LOREN CHASTAIN

The Problem and The Method

IN performing the experiment which I shall briefly describe, I had in mind two purposes: first, an earnest desire to find out in a scientific way some data to supplant current opinions as to the relative values of different types of assignments in a geometry class; second, a wish to satisfy myself as to the feasibility of conducting a controlled educational experiment.

The particular problem was selected because of my personal interest in the teaching of geometry, and also because of the suggestion of Dr. Childs that this would be a good problem for experimental investigation.

The problem investigated is: What are the relative values of the two following types of geometry assignments:

Type 1. A carefully planned, analytical assignment, consuming about 15 minutes of time in which pupils participate in outlining:

1. What is given?
2. What is to be proved?
3. Given certain facts, what others follow?
4. Of the facts known, which can be utilized in reaching the desired end?

Type 2. An assignment made by the "proposition and exercise number type", consuming about one minute of time.

Stated briefly the problem is: Which is better, to spend about 15 minutes of the class period on the assignment, or to spend only a very brief time on the assignment and use the time thus saved for the recitation?

Sample Types of Assignments actually given: March 24, 1925

Experimental section: Teacher draws figures upon the blackboard for Exercise 1, Corollary 1, and Corollary 2, p. 63, Newell and Harper. "Given" stated by a pupil with aid of the text; another states what is to be proven for Cor. 1, Part 1. Question by teacher: "Any other facts?" Gertrude: "Sides are equal and parallel and the angles are right angles." Question by teacher: "What suggestions do you have for the proof?" Maxine: "If you can prove triangles congruent the diagonals are corresponding sides and will be equal."

"Given" and "to prove" stated by two different pupils for Part 2 of Cor. 1. Teacher: "Any other facts?" Harriett: "The sides opposite are equal and parallel." Teacher: "Any suggestions as to proof?" Theodore: "Prove triangles congruent and then the angles right angles."

"Given" and "to prove" for Cor. 2 stated by two different pupils. Teacher: "Any other facts?" Emily: "Draw OD, DA, and DC. Then DC=AB and AD=BC." Teacher: "Any suggestions as to proof?" Theodore: "Prove the figure a rectangle then the diagonals bisect each other."

"Given" and "to prove" stated for Exercise 1 in same manner as above. Suggestions? Rowena: "Prove triangles congruent and then we know sides are corresponding and therefore equal."

Check Section: Assignment: Corollary 1, Corrollary 2, and Exercise 1, p. 63

The method of experimentation chosen for the study of this problem is the one known as the "equivalent group method". Distinguishing characteristics of this method are: two or more groups of equivalent abilities, both groups treated exactly alike except for the experimental factor. The chief advantages of this method are: first, there is no danger of carry-over from one experimental factor to another; and second, identical lessons can be taught both sections by two different methods.

The experiment was conducted in the Short high school, Liberty, Ind. It began January 19, 1925, and continued for one semester of eighteen weeks, ending May 29, 1925. Two sections of equivalent abilities were chosen. All were first-year geometry students taking the subject for their first time. One section was given the carefully planned, analytical assignment, type 1. The time for the assignment was taken during the latter part of a 40-minute recitation period. The other section was given the assignment by "proposition and exercise number", type 2, otherwise the procedure was the same for both sections. The amount of work covered was exactly the same each day. The method of conducting the recitation was the same in both sections. Both sections were given the same tests on the same day every two weeks, and the scores compared.

Precautions Taken to Eliminate All Variables except the Experimental Factor

1. The sections were equated on the basis of the total scores made on the Otis Self-Administering Intelligence Tests, Higher Form A. Two pupils who made equal scores were paired, one placed in the experimental section, and the other in the check section. Both were designatd by the same number as IE=IC. When pairs had IE=IC not exactly equal scores, care was taken to see that the general averages of the two sections were the same. After the sections were paired in the above manner a penny was tossed to determine which section would be designated the experimental. Pupils whose scores were extremely high or extremely

low were taught, but no attempt was made to section them or use the data in this problem.

2. None of the pupils had had any geometry previous to this experiment.

3. All of the pupils had covered the same amount of algebra in high school before taking this work in geometry.

4. The same teacher, myself, taught both sections.

5. Both sections recited during the morning, one from 9:12 to 9:52, and the experimental from 9:55 to 10:35, or the period immediately following.

6. The amount of the assignment was the same for each section each day. And the method of demonstrations was exactly the same for each group.

7. In regard to the amount of time spent in preparation of the lesson both sections were given the following instructions: "Each day spend 40 minutes of careful study on the assignment. Do this in the assembly room in the afternoon. If you cover the assignment in less time go over it again until you have spent the 40 minutes. If you cannot cover the assignment in one 40-minute period, spend sufficient extra time to carefully cover the assignment one time. Each pupil is upon his honor to do this."

8. Pupils were upon their honor not to ask or accept any outside help. All questions were asked of the teacher and he refused to answer any questions of a nature that would influence the data.

9. Both sections were given the same tests every two weeks. These tests were made out by three different mathematics teachers. I placed the text and a supplementary text in the hands of the teachers and informed them how much work had been covered. Then without any further remarks from me these teachers selected the test exercises and propositions.

10. In scoring the papers I exercised extreme care. As a basis for scoring, a questionnaire was sent to fifty geometry teachers, and the average weight given to the points by the thirty who responded was taken. This average was used as an arbitrary basis for scoring all papers. Each pupil placed a 4-place number on his paper, and the papers were not identified by the scorer until after the marking was completed.

11. The pupils were unaware that any experiment was in progress.

The Questionnaire

To the Teacher of Mathematics:

I am conducting an educational experiment in geometry under the supervision of Indiana University. In order to check the progress of each section I am giving each the same test every second week. These papers must have a weighted uniform standard of grading. If you were grading a test consisting of one proposition and two exercises of either of the forms given below what weight would you give to each part? Please fill in both forms given below and place in the enclosed envelope and mail. May I have this within one week? Thank you.

Test A:

One proposition:
- A. Stating what is given..... 6.5
- B. Stating what is to be proven..... 6
- C. Correct proof 16
- D. (Any other item) Correct figure..... 2.7

Total 31.2

One original exercise:
- A. (As above)..... 6.9
- B. 6.5
- C. 18.2
- D. Correct figure 2.8

Total 34.4

One original exercise:
- A. 6.9
- B. 6.5
- C. 18.2
- D. 2.8

Total 34.4

Grand Total 100%

Test B:

One proposition:
- A. (As above)..... 6.5
- B. 6.4
- C. 16.4
- D. (Correct Figure)..... 2.7

Total .....32.

One original exercise:
- A. (As above)..... 8
- B. 7.2
- C. 20.5
- D. 3.8

Total 39.5

One exercise which has been previously studied:
- A. (As above)..... 5.6
- B. 5.4
- C. .....15.
- D. 2.5

Total 28.5

Grand Total 100%

Loren Chastain
Principal of Short High School,
Liberty, Ind.

Absence:
- Section C: 7 cases, 36 days.
- Section E: 9 cases, 29 days.

Division as to boys and girls: No attention paid to it at first in the division, but it happened thus:
- Section C: 8 boys, 6 girls.
- Section E: 7 boys, 7 girls.

Results: Comparison of Sections by the Mean Scores of all 9 Tests

Pupil No.	Mean Score	Pupil No.	Mean Score	Experimental Gain	Control Gain
1e	70	1c	65	5	
2e	83	2c	49	34	
3e	53	3c	53		
4e	61	4c	63		2
5e	86	5c	66	20	
6e	47	6c	65		18
7e	35	7c	60		25
8e	50	8c	39	11	
9e	45	9c	39	6	
10e	79	10c	40	39	
11e	52	11c	48	4	
12e	54	12c	37	17	
13e	30	13c	35		5
14e	71	14c	32	39	

1e and 1c were pupils of highest intelligence.
14e and 14c were pupils of lowest intelligence.

Median:

E-scores	53.5
C-scores	48.5

Mean:

E-scores	58.3
C-scores	49.4

$$\sqrt{\sigma m \text{ of } x — \sigma m \text{ of } y} = 1.12$$

A chance difference would not be more than 3 times the above or 3.36. My difference between means is 58.3—49.4 = 8.9 and cannot be caused by chance.

COMPARISON OF MEAN SCORES BY QUARTILES

	Experimental Section	Check Section
Q3	75	63
Q2	57.5	46.7
Q1	47.5	37

Conclusions

I realize there are limitations to this experiment. I am not ready to form firm conclusions from one experiment. I have stated the problem

and the way I have handled it. The reader can judge for himself the weight of the results.

It seems to me that the data point to the following:

1. No one method of assignment is adapted to all pupils if best work is desired. What is best for the mentally weak is not best for the brilliant ones.

2. Classes should be sectioned on basis of intelligence and different methods used.

3. If divided into two groups there is little difference which method is used with the upper 50 per cent.

4. But with the lower 50 per cent a big difference is shown in favor of the carefully planned, analytical assignment.

It seems to me a problem which supervisors should recognize.

The Administration of Athletic Funds in Indiana High Schools

CURTIS D. KIRKLIN

WITHOUT doubt the most important extra-curricular activity in the high schools of Indiana today is athletics. In fact in many schools it is the only form of extra-curricular activity in which the school participates. Intense interest is taken in athletics by the students, faculty, patrons, and the friends of the school in the community. Athletics has been the means of promoting interest in the high schools among persons who otherwise gave no attention to them.

Most school officials recognize the importance of athletics and have given the athletic program their most hearty support. There are certain problems connected with this phase of our school work that are deserving of attention. The number of games to be played, the proper certification of players and officials, the holding of tournaments, and others are matters that have been handled in an excellent manner by the Indiana High School Athletic Association. There is another problem that lies outside the domain of the above organization, yet it is a very important one to the local principal or superintendent. This problem is that of the administration of funds derived from athletic sources. During the basketball and football seasons eager crowds of students and friends of the school crowd the gymnasiums and athletic fields to see the high school teams play. Vast sums of money come under the direction of school officials from this source. To a certain degree these funds are semipublic in their character. It is of great importance to all that this money be handled in an intelligent and business-like manner, and in such a way that the greatest educational benefits will be derived from their use.

Having been a high-school principal and confronted with some of the problems just mentioned, I desired more information concerning the situation. A questionnaire was prepared under the direction of Dr. H. G. Childs covering different phases of the local administration of athletic funds. This questionnaire was sent to 764 high-school principals of Indiana. A total of 184 questionnaires were returned and were used in the investigation. This number is slightly over 24 per cent of the number sent out. What effect a larger return would have had on the results is only conjecture.

The topics covered by the questionnaire were as follows:

1. Sports in which the school participated.
2. Sources of income for each sport.
3. Expenditures for each sport: *(a)* athletic; *(b)* non-athletic.

4. Control of funds: *(a)* custody of funds; *(b)* control of expenditure; *(c)* composition and duties of athletic board of control; *(d)* business manager; *(e)* audit of books; *(f)* making of a public statement of receipts and expenditures of athletic funds; *(g)* chief features of plan for handling athletic funds.

5. Gymnasium and athletic fields: *(a)* cost; *(b)* by whom financed; *(c)* capacity and dimensions.

I will devote a greater part of this discussion to a consideration of the following points: *(a)* income; *(b)* expenditure; *(c)* administration of the funds. Reference will perhaps be made to the size of the schools. The schools were divided into the following groups: Group I, enrollment of less than 75 pupils; Group II, enrollment of 75 to 200 pupils; Group III, enrollment of 201 or more pupils.

Sports in which the Schools Participated

The questionnaires revealed the following facts:

No athletics, 18.	Number Playing	Median Number of Games
Basketball	155	19
Football	19	8
Baseball	88	4
Track	42	
Tennis	9	

A further analysis of the data brought out the following information: Over 90 per cent of the schools have some form of athletics. Of course basketball is the sport most commonly found in Indiana high schools. Practically 100 per cent of the schools having athletics play basketball. It is even played by the smallest schools. One school having an enrollment of only 14 played 12 games. Football is not a small school sport, since none of the schools in Group I and only 3 in Group II played football. Slightly over one-fourth of the Indiana high schools participated in track, while less than 6 per cent play tennis.

Looking at the results of the questionnaires from slightly another angle I discovered the following:

56 schools participated in 1 sport only.
62 schools participated in 2 sports only.
33 schools participated in 3 sports only.
4 schools participated in 4 sports only.
2 schools participated in 5 sports only.

In other words, 76 per cent of the schools do not have a varied athletic program, but one that consists of not more than two sports.

Suggestions

From the above data it appears that most of the Indiana high schools indulge in only one or two sports. The athletic program should be so arranged that it would extend more nearly over the entire school year and include a greater variety of sports. Such activities as track and tennis do not require a great number of students, yet they are very

seldom included in the athletic program. These sports could be successful even in the smallest schools. A greater variety of the forms of athletics would result in spreading the athletic work over the entire year and make it possible for more students to participate.

The writer believes that it is essential that we have a greater variety of athletics. Too often the spectator part of the physical education program has been placed first. There has been a tendency in athletics to push the good student to the limit and neglect the others. All students should be given an opportunity to develop in such a way that they will be really helped physically. This can be done only by having a greater variety of sports.

Johnston says that there are two contending aims of physical activity. One seeks the recreation, education, and the development of the individual; the other seeks the entertainment and applause of spectators. I believe that each has its place, but that neither should be given undue prominence. If physical education performs the important functions claimed for it, its effect should be felt by more than a few for the benefit of the spectators' amusement. It should be an integral part of the school program, administered and financed by public officials.

The reports show that only .7 per cent of the athletics receipts come from school officials. If the athletic program can be self-supporting this is very desirable, but if not so, then the responsibility rests with school boards and township trustees to see that it is put on the proper financial basis, otherwise only those sports that are self-supporting will be engaged in, and there is danger that the athletic program will be commercialized. School authorities should decide what sports are most desirable for the physical development of the students and include these in the athletic program, to be supported by public funds if necessary.

Income: Basketball

Total	$99,992.88	
Range	7.50	to $7,158.58
Average	729.88	

The tabulations show that the smaller schools receive a larger percentage of their income from school officials than those with larger enrollment. Gate receipts and tourneys account for almost 95 per cent of the income in basketball. The average income is $729.88, of which only $5.80 is contributed by school officials.

Income: Football

Total	$20,429.10	
Range	125.00	to $5,042.36
Average	1,261.94	

It is noticeable that no aid was received from school officials.

Income: Baseball

Total	$313.72	
Range	2.50	to $63.50
Average	20.92	

The income from baseball is exceeded by all other sports except tennis. This is perhaps due to the fact that very few schools have a baseball park in which they can hold their games and charge admission.

Income: Track

Total	$586.31
Range	25.00 to $186.35
Average	117.26

Evidently the interest in track in Groups I and II is not very great, since none in Group I and only one in Group II reported any income. It is noticeable that in track the school officials contribute a larger percentage of income than in any other sport.

Only one school reported any income from tennis. Ten dollars were raised by subscription to finance the tennis activities.

A total of $921.20 in income was reported but the sport from which it was derived was not indicated.

Summary of Receipts for All Sports

		Per Cent of Total
Gate	$105,009.25	80.5
Tourney	18,059.65	13.8
School Officials	893.17	.7
Miscellaneous	6,580.04	5.0
Total	130,542.11	
Range	7.50 to $10,217.17	
Average	907.19	

Over 94 per cent of this total income was derived from the sale of tickets and from tourney receipts. This percentage increases from 82 per cent in Group I to 98 per cent in Group III, indicating that athletics are more nearly self-supporting in the larger schools. The amount of money that high school principals are sometimes called on to handle is shown by the amount $10,217.17 handled by one school.

The following table shows the total income that each sport contributes and the percentage of each of the total income from all sources.

		Percentage of Total
Basketball	$99,992.88	76.6
Football	20,429.10	15.7
Baseball	313.72	.24
Tennis	10.00	
Track	586.31	0.45
Unlisted	9,110.10	7.00
Total	$130,542.11	

In Group III the importance of football as a producer of revenue is seen, basketball contributing approximately two-thirds of the income, and football one-fourth of it. Considering all groups together, the con-

clusion may be drawn that basketball and football are the main sources of income, since they contribute 92.3 per cent of the total income, while tennis, track, and baseball together furnish only .7 per cent.

Expenditures

Expenditures were classified under the following headings: uniforms, equipment, pay of officials, expenses of visting teams, gymnasium rent, honors, medical attention, miscellaneous expenses.

A summary of total expenses for all sports is as follows:

		Percentage of Total
Uniforms	$18,198.15	18.1
Equipment	13,150.05	13.1
Visiting teams	23,326.11	23.2
Officials	13,070.28	13.0
Rent	5,658.02	5.5
Honors	4,726.10	4.6
Medical attention	2,429.43	2.3
Miscellaneous	20,222.16	20.2
Total	100,770.30	
Range	7.50 to 6,492.20	
Average	680.88	

A more detailed examination of the returns shows that in basketball practically two-thirds of the expenditure was for uniforms, equipment, expenses of visiting teams, and officials; in football over a third of the entire amount was expended for equipment and uniforms; for all sports combined about a third of the total expenditure was for uniforms and equipment; the largest single item of expense was for the traveling expenses and entertainment of visiting teams; honors represent 4.6 per cent and medical attention only 2.3 per cent.

COMPARISON OF RECEIPTS AND EXPENDITURES

	RECEIPTS		EXPENDITURES	
	Amount	Per Cent	Amount	Per Cent
Basketball	$99,992 88	76.6	$68,991 42	68.8
Football	20,329 10	15.7	20,231 31	20.2
Baseball	313 72	.24	2,109 75	2.0
Tennis	10 00	.01	38 00	.04
Track	586 31	.45	2,627 69	2.5
Unlisted	9,110 10	7.0	6,771 30	6.5
Total	$130,542 11	.....	$100,770 30	.....

It is noticeable that the percentage of total receipts for basketball is greater than the percentage of the expenditure for the same sport. This means that basketball is not only paying for itself but is helping to support other lines of athletic activity. Football is the only other sport that is self-supporting. Baseball, tennis, and track have expended on them respectively about 7, 4, and 4½ times as large amounts as they contribute. It is interesting to note that the schools report that they have collected about $30,000 more than they have spent. Taken as a whole the athletic program is self-supporting, due perhaps to the fact that no great amount of emphasis is placed on sports that are not self-supporting.

Non-Athletic Expenditures

One of the most interesting parts of the entire investigation was that part concerning non-athletic expenditures.

		Percentage of Total
Gymnasium and equipment	$6,106.06	53.1
Playground	1,470.11	12.7
Lockers	990.54	8.6
Athletic field	750.86	6.5
Books	444.45	3.8
Movie outfit	330.00	2.9
Stage	289.00	2.5
Piano	220.00	1.9
Miscellaneous	154.05	1.3
Pictures	146.33	1.2
Annual	131.45	1.1
Clock	55.00	.5
Anti-T.B.	50.00	.4
Flowers	47.13	.4
Showers	37.00	.3
Latin and typing contest	21.00	.2
Total	$11,597.22	

An examination of the above table shows that expenditures for three items—gymnasium equipment, lockers, and athletic fields—receive 68.2 per cent of this so-called non-athletic expenditure, leaving a total of only $3,649.76 for the other items.

Conclusions and recommendations concerning expenditures:

1. About 90 per cent of the total expenditure was made for basketball and football. Baseball, track, and tennis receive less than 5 per cent of the total expense.

2. Uniforms, equipment, expense of visiting teams, and officials required over two-thirds of the money expended.

3. Medical service and supplies required only 2.3 per cent. The writer feels that since such a small amount was spent for medical attention, medical inspection of our high school athletes has been neglected. During the period of competition watch should be kept on the

individual players. Injuries come when the player is fatigued or out of condition or training. The high school athlete is at a critical stage in his physical development and should be under supervision, and that not by a coach alone but by someone who knows the conditions and who is not willing to sacrifice the player for the winning of a game.

4. In many schools athletics is the only form of extra-curricular activity that has an income, while there are many valuable activities that need financial assistance. The income from the games has come from the student body and the public in general, and the school as a whole should profit by the expenditure of these funds. Some school officials require that all extra-curricular funds, some only a certain percentage of them, be turned into a general fund, which is used to finance all worthy activities of the school. If this plan were followed I believe that these other activities would receive more adequate recognition. School activities need financial assistance, and the athletic funds should be used in furnishing some of the necessary money.

The Control of Athletic Funds

I will now discuss the answers that were given to certain questions that were asked in the questionnaire concerning the control of funds.

1. Is any part of the athletic funds given into the control of the school board or trustees? Slightly over 8 per cent of the schools report that they give the control of the funds into the hands of the above-named officials. There seems to be more of a tendency for the larger schools to do this than the smaller ones. Only 6 per cent of the amount of the athletic funds are handled in this manner. So, in the main, athletic funds are not handled by the school board or trustee.

2. Who has custody of the funds? In 105 schools the principal either alone or with an assistant has the funds in his charge; in 71 the principal alone; in 17 a member of the faculty other than the principal; in 3 cases the trustee or school board; in 11 the coach alone; in 3 the coach and students; in 1 the superintendent; in 15 the students alone. In the majority of schools the funds seem to be in the hands of responsible persons.

3. Who makes the decision concerning the expenditure of funds? The principal either alone or with assistance makes the decision as to how the money shall be spent in 100 schools; the coach in 13 cases does so; in other cases the faculty, board or trustee, entire school, superintendent, or the athletic association.

4. Do you have a board of control? Less than one-third of the schools answered "yes" to this question, mainly among the larger schools. The most frequent combination making up this board is that of the principal, coach, members of the faculty, and students. Duties of the board of control are direction of the expenditure of funds, deciding on purchases, determining policies, and control of budget.

5. Who audits the books of the treasurer? In 36 cases the principal assists; other persons who do this are coach, faculty member, students, board member or trustee, superintendent, board of control, or patron. Auditing of the treasurer's books is done more frequently in the larger schools than in the smaller ones.

6. How often is the audit made? The audit is more often made yearly than at any other time, altho some schools have the books gone over semiannually, some monthly, while 72 schools say that no audit is made at all.

7. Do you make a public statement concerning the receipts and distribution of athletic funds? One hundred answer in the affirmative, 43 in the negative, and 41 make no report. Thus over 50 per cent of the schools keep their public informed concerning the use of these funds. This report is generally made annually.

8. Indicate briefly the main features of your plan of handling athletic receipts and expenditures. The replies that were received may be divided into two general classes: *(a)* those that leave the control and custody of funds entirely with students, and *(b)* those schools that place the responsibility with the principal or faculty. The latter form seems to be the most prevalent.

Recommendations

1. The principles of general financial control should be applied directly to the handling of athletic funds.

2. Students should not be allowed to collect funds or to have the custody or the control of expenditures. Too often students (whom their own fathers would not trust) have been allowed to handle high school funds. Money has been collected and spent without any supervision of the faculty. This is not fair to the students, as it is placing needless temptation in their way.

3. The control of the funds should be in the hands of a responsible person. Most high-school principals should be relieved of this duty by the appointment of a financial manager. This official should be a member of the high school faculty, and have charge of all money and pay all bills with the proper authorization. He should furnish bond to an amount not less than twice the amount of money that he will have in his possession. This bond should be approved by the board of education.

4. A board of control should be appointed to assist the financial manager and to approve the financial policy of the athletic program. The financial manager should be the chairman of this board.

5. A complete and accurate set of books should be used, together with a voucher and budget system. The accounting system must be leak-proof and have rules that can be enforced. The simpler the books are the better without sacrificing accuracy. The financial condition should be easily determined. When a bill is presented payment should be made by voucher, which when canceled can be filed as a receipt. The budget would set forth the financial plan for the year. It should have the final approval of the principal.

6. Some of the detailed work may be done by advanced students in the commercial department. Thus some of the educational objectives of the school may be realized in some measure.

7. An independent audit of the books of the financial manager should be made, and the public and the school board informed concerning the collection and distribution of all funds derived from athletics.

8. The advantages of such a system as I have outlined are:

a. All money is under school supervision.

b. It is impossible to spend money without authority.

c. The pupil is relieved of temptation to use school funds.

d. No bill is paid more than once.

e. The principal is relieved of much work.

f. The expenditures are kept within income.

g. Students are given an opportunity better to understand methods of business and the necessity of regarding financial obligations seriously.

h. The confidence of the public is increased by having the books audited by an independent accountant and a public report made.

Gymnasium and Athletic Fields

In answer to the following question, "Does school own.....?" the following results were obtained:

Below is given the number of schools owning:

Gymnasium	89
Football field	16
Baseball field	49
Track	14
Tennis court	52
Swimming pool	5

Summary

1. Over 48 per cent of the schools now own gymnasiums.

2. The average gymnasium presents the following picture: Its date of construction was after 1920, probably in 1923; it cost about $22,500; paid for by taxation; located in the high school building; has a seating capacity of 675; and a floor whose dimensions are 67 feet by 41 feet.

3. Fifty-five schools are now planning to build gymnasiums, about 26 per cent of which already have a gymnasium.

4. A composite picture of the proposed gymnasium is as follows: it will be paid for by taxation; be separate from the high school building; cost about $25,000; will seat 1,200 people; and will have a floor 66 feet by 44 feet.

Recommendations

There is little doubt that Indiana communities approve of the gymnasium building program. However, they should be used for physical education. It is doubtful if the large sums of money can be justified for a gymnasium used solely for inter-scholastic athletics. The aim in the construction of such a building should be to accommodate the greatest number of pupils at all hours of the day. The student that needs the training most should receive the attention. Such a plan does not mean the elimination of inter-scholastic contests. The income from the inter-institutional games should provide the means for financing such a program for all.

The location of the gymnasium should be determined by the purposes for which it is to be used. If the building is to be used during the school hours the noise that naturally arises from play would suggest a detached or semi-detached building. Convenience in the use of the building by the community would also favor a separate building.

In building a gymnasium the major emphasis should not be placed on increasing the seating capacity, but on providing for the proper kind of physical training. If the receipts from athletic contests are used to finance the physical education program, then adequate provision should be made for both the spectacular and educational phases of the work.

More attention should be given to outdoor sports and better provisions made for them. The more time that the student is in the open air the greater good will he derive from the physical training. Provision should be made for baseball, track, football, and tennis. These fields should be close at hand, since a small field close to the school is more valuable than one farther removed.

The Scope of the Research Work in the Arsenal Technical Schools (Indianapolis) with Some Evidences of Its Value

MILO H. STUART

THE secondary schools of the country are for the most part working in a field of educational activity for which there is little precedent. It is assumed that great social benefits will result for the future from a policy which is providing a formal education for the great mass of boys and girls who fall within the high school age. Whether this assumption is warranted likely will never be determined except, possibly, by the broad judgment of future generations. But since the policy of universal secondary education is in effect, there are so many phases of the process about which we need to be more sure that it is only by a continuous process of analysis and study that we can make ourselves even reasonably certain that the efforts which we are putting forth are in a direction that is profitable.

Since the Arsenal Technical Schools of Indianapolis are an outgrowth of a public movement to establish on the Arsenal grounds, in trust, a secondary school peculiarly suited to meet the varied needs of a large high school population, it is especially necessary that a research program accompany its development. It is, therefore, our policy to lend encouragement to every form of research and study which might lead to establishing situations which give promise of promoting the interest of the pupils of the school. Such research serves three important purposes: (1) it serves to ascertain the degree to which the school is attaining its avowed objectives in its various branches of activity; (2) it enables the institution to determine in what direction adjustments need to be made in the interests of better teaching conditions and teaching methods; (3) it serves to stimulate each member of the faculty to assume a student's point of view toward the teaching problems and thus minimize dogmatism and arbitrary or erratic setting of standards of pupil attainment.

At the present time the research committees of the school are making inquiry along sixteen different lines. These studies are so formulated that they ramify to all aspects and phases of the school's work. The problems for which a solution is being sought are as follows:

1. How does class size affect pupil attainment?
2. How can standardized tests be used to aid pupils in vocational choice?
3. How can standard tests and grade teacher rating be used to aid teachers in making a proper judgment of pupils?

4. To what extent can a program of grammar teaching and testing for the first two weeks of a semester be made helpful in locating pupils for whom language is unprofitable and in determining the basic weaknesses of all pupils toward which teaching effort may be directed?

5. What are the definite results achieved thru the use of minimum essential tests and hurdle tests in English?

6. How widely do the marks of an individual pupil vary in one department under different teachers?

7. What is the school's mark distribution? (*a*) By department? (*b*) By teachers? (*c*) By grades of a subject within a department?

8. What is the pupil-hour cost, credit cost, departmental administration cost, for the school as a whole?

9. What is the relative school success of three groups of pupils on an age basis—the two-year accelerates, the normal age, and the two-year retarded?

10. What is the standard of success in a given subject of those pupils who have received a credit in such a subject from the grades before reaching high school?

11. What is the distribution of class size by departments within the school?

12. What is the success of an atypical group that has been placed in lesson sheet classes?

13. What are the direct results achieved by special attention to those pupils whose success grade indicates that they are doing less than half of the work of a normal pupil?

14. To what extent is the school preparing its pupils for a definite line of activity after leaving high school?

15. To what degree are the pupils coming from the grades, making a choice of high school subjects which is consistent with their purpose, interests, and abilities?

16. To what extent does high school work, done in the grades, affect the election of language in the high school?

It is not the province of this paper to make a detailed report upon each or upon any one of these problems. Rather it is my purpose at this time to call attention to the nature of these inquiries that it may be suggestive of the way in which a study of such scope may contribute to the working efficiency of a school. Eleven of the problems are related directly to the administrative policies of the institution. Five of them are concerned with the results of the teaching processes within the various deparments under varying conditions. Certain of these studies are merely statistical in their nature. For these it is but a matter of recording and classifying significant information about the school as a means of knowing what is taking place. In this paper I shall discuss briefly some phases of the study of six of these questions:

1. How does class size affect pupil attainment?

2. How can standardized tests be used in aiding in vocational choice?

3. How may standard tests and grade teacher ratings be used to aid in supervision and in helping teachers to make a proper estimate of pupils?

4. How nearly is the distribution of grades of the school conforming to a reasonable distribution basis?

5. To what extent can a program of grammar teaching and testing in the first two weeks of a semester be made helpful for beginners in language, in locating pupils for whom language is unprofitable, and in determining the basic weaknesses of all pupils toward which teaching effort may be directed?

6. What are the definite results achieved thru the use of minimum essential tests and hurdle tests in English?

In recent years the question has been raised as to whether the class size, which has largely been determined by custom, modified by the pressure of increasing school population and instruction costs, is that which will produce the most favorable results. Certain scattered studies have indicated that there is a possibility that pupils achieve more in classes that are relatively large. The essential purpose of this study is not to increase the pupil load of the teacher, but rather by readjustment of class size to save the time of the teacher for giving attention to individuals who need special attention. This study in the Arsenal Technical Schools is being conducted in coöperation with the committee appointed by the National Principals' Association to investigate this particular problem.

1. *The Study of Class Size*

In practically all of the academic departments of our school a study of large and small classes has been made to determine the effect of size on grade distribution and on pupil attainment. This investigation involves a study of the following questions:

(1) Is it possible to have larger classes if pupils are homogenously grouped?

(2) Can classes of good students be larger than classes of poor students and the work be kept equally effective?

(3) Can classes in one subject be larger than classes in another?

(4) Does a brilliant student succeed better in a larger class than in a small one?

(5) Are the chances of "getting by" enhanced for certain types of students by being in large classes more than by being in small classes?

The bases of judgment upon the relative success of classes may be any of the following: (1) the percentage of success and failure in classes of varying sizes; (2) the relative achievement of large and small classes as determined by standard tests of achievement; (3) the success in future work in the same line of pupils having been previously in large or small classes; (4) and the general judgment of the teachers regarding the satisfactory results attained in large or small classes. In all cases, of course, a standard of rating pupil ability must be used.

In a few departments an experiment is being made by segregating the rather small per cent of pupils composing the exceptionally bright group and those composing the exceptionally dull and of forming large classes of the great number of students who fall between these two groups. An attempt is being made to determine whether, on the ground

that the ability of the various members of this group is practically the same, these pupils cannot be effectively handled in a class above the average size.

Another interesting experiment in large classes is being made in an advanced history class which is composed of exceptionally capable history students, chosen on past achievement. The class meets only one day in the week, and during the remainder of the week its members are free to work out their history assignments. This class covers only the regular allotted outline of work but makes a very much more comprehensive study than classes of average ability are able to do.

Another experiment in class size has been made with those pupils in various departments who apparently need an extra amount of teacher assistance. These people are grouped together into classes of double size and are held by their class teachers for a double period of recitation. In this way needy pupils can be given ninety minutes of class instruction at the ordinary cost of forty-five minutes. The teachers of these double period, double size classes are assisted by advanced high school students and by college cadets.

In the mathematics department an experiment has been made by placing thirty dull students together in a class with four exceptionally bright mathematics students who are studying the same course. These capable students serve as student teachers, working individually with the failing pupils in an attempt to meet their individual needs.

2. *How Can Standard Tests Be Used in Aiding in Vocational Choice?*

An attempt is made in Civics II (Occupational) to give vocational guidance and vision. The subjects in the first year of our school are so arranged that the pupil who dodges college entrance requirements, who dodges vocational or prevocational courses, in which the occupational choice is inherent, finds himself in the course in Occupational Civics. We have, thus, approximately five hundred students at one time who are interested in the subject of vocational choice as one of their daily subjects. This not only constitutes a very fertile group for occupational experimentation, but one large enough to make it worth while to go to considerable extremes to find out the best ways to impart vocational direction. The course of study is made up of informational subject-matter along vocational lines supplemented by studies of individual aptitudes. In this connection the standardized tests are being used to good advantage.

In presenting these tests an attempt is made to convince the pupil that he is not merely being examined to determine what he does or does not know, but that the tests are for the purpose of learning in which lines his aptitudes lie so that he may be more helpfully advised in his curricular choice.

In order that pupils may take these tests with a zest, the general background is given them that industries now use such tests to determine the most desirable candidates for positions.

These tests cover various kinds of achievements and ability, viz.:

(1) General intelligence as measured by the National Intelligence and Indiana University Intelligence Tests.

(2) Vocabulary by the Thorndike Test of Word Knowledge.

(3) Reading ability as determined by the Thorndike-McCall Reading Test.

(4) Clerical aptitude as determined by the Thurstone Employment Tests.

(5) Mechanical ability and acquaintance thru the Stenquist Tests in Mechanical Aptitude, Tests I and II.

An attempt is made to plot the pupil's relative standing in each of these activities in order that a visual presentation of his abilities may be available for teachers and all advisers for conference purposes. With this information at hand together with information concerning health, age, home environment, occupational environment, and heredity, it is the more possible to disuss a pupil's school and occupational future with intelligence and understanding.

3. *How May Standard Tests and Grade Teacher Ratings Be Used to Aid in Supervision and in Helping Teachers to Make a Proper Estimate of Pupils?*

In Indianapolis the research department of the public schools has made provisions for the mental testing of all pupils, and the record of the pupil's intelligence quotient is sent to the high school with the pupil's certificate of graduation. In addition to this the teachers of the grades make ratings of all pupils on a five-point scale, I being superior and V especially weak. To make this information of worth to the high school, plans are now evolved whereby department heads or supervisors may use these for aids in following up the various gradings given.

In order that the greatest use of such material may be made, the chairman or head of each of the academic departments has special departmental class lists prepared upon which space is provided for the recording of the following salient facts concerning each pupil:

(1) The marks given by the teacher of the class upon the basis of the work which the pupil does in that subject together with the number of absences from class recitation.

(2) All information gathered from a variety of sources concerning the pupil which throw light upon the pupil's ability to do the work, and the environment in which he lives which contributes either to school success or to school failure. Under this second class of information there is provision made for recording the following types of information:

(*a*) The pupil's rating from the grades upon the basis of the work which he did there.

(*b*) His intelligence quotient.

(*c*) His chronological age.

(*d*) His attainment in such significant lines as reading, spelling, vocabulary knowledge, clerical ability, and attainment upon department tests given within the school, and whatever other facts may have a bearing upon the pupil's school work.

This encourages a comparative study of the gradings of each child by the grade school teacher and the high school teacher. In the cases in which these estimates agree in a satisfactory manner, no further investigation is made. In an unusual variance the attention of the teacher in the case is called, and a careful study is made.

To facilitate a more comprehensinve study, correlation charts for entire classes are made. By means of these charts it is possible for department heads and teachers to determine the degree to which the various known elements about the pupils are contributing to success or failure of the entire class, or to determine whether the success of the pupils as a whole within a class is correlating with pupil ability and achievement as measured by other standards.

4. *How Nearly Is the Distribution of Grades Conforming to a Reasonable Distribution Basis?*

Perhaps one of the most common phases of research now being carried on in all educational institutions is that of standards of marking of pupils upon their class achievement. School marks in recent years have taken on a new significance to the pupils of our schools; they are the coin of the educational realm. In a time when appointment to positions, granting of scholarships, and many other items incident to the individual success are determined by school marks, they take on an economic significance not possessed in such large measure hitherto. It may be that upon the question of whether a boy received a *B* or an *A* in solid geometry will hinge the determination of the granting of a university scholarship. Because of this new significance allotted to grades, it is of greatest importance to the pupils of a school that the administration use every means possible to keep its grading standards for every teacher reasonable and free from injustice or personal idiosyncrasies.

So far as I know, no satisfactory approach to a solution of the problem has ever been made. The teacher must be supreme in the matter of determination of her pupil's marks, and no dictation from administration can be permitted. In some institutions arbitrary curves of distribution have been formulated as a standard to which all teachers must conform.

The Arsenal Technical Schools have attempted to meet the problem in part by setting up an agency for the honest study of the question. Perhaps the greatest single advance that can be made toward a solution of this problem is to create a spirit of study about grading which will counteract the prevalent tendency of teachers to develop pseudo-standards determined merely by pecularities of training and disposition. When it is possible to get each member of a faculty of an institution to know what his grade distribution is as compared with other members of his department, as compared with other departments of the school, or as compared with the school as a whole, a start has been made toward adjusting personal standards to a standard which is determined by a composite judgment.

For several years we have been making detailed analysis of grade distributions at each mark time. Our research committees are taking the facts, analyzing them by departments and by teachers, making graph charts showing shifts of standards, showing failures and successes thruout the term, and thus setting up a clearing-house of information which we trust will eventually bring about a greater light upon the problem. As a result of this policy the grade record for the October marks in the Arsenal Technical Schools shows that in five academic lines of work in which class conditions were comparable (i.e., recitation forty-five minutes, with outside preparation required) the percentage of failure varied only .008. A sixth department, however, had a percentage of failures .045 lower than the average of the five previously mentioned.

5. *To What Extent Can a Program of Grammar Teaching and Testing in the First Two Weeks of a Semester Be Made Helpful for Beginners in Language in Locating Pupils for Whom Language Is Unprofitable and in Determining the Basic Weaknesses of All Pupils Toward Which Teaching Effort Must Be Directed?*

Since lack of comprehension of fundamentals of English grammar has repeatedly been submitted as the dominant factor in the heavy toll of foreign language fatalities in high school, this angle of approach was used in the semester beginning February, 1925, to analyze methods of discovering those pupils foredoomed to failure. A two-weeks' drill on fundamentals of English grammar applicable to Latin I with searching tests was provided by a Latin departmental committee. Results at the close of the term show that almost all failing in the two weeks' preliminary work failed at the end of the term in Latin I grade. In every case it may be said where the I.Q. rating from the grade was low, the grade school work in English below average, and the pupil's work in the two weeks' drill was poor, the pupil failed to pass in first semester of foreign language. The combination of these three ratings seems to provide a very accurate means of prognosticating success or failure for pupils in foreign language study, and on this basis the school hopes to be able to advise such pupils to go into a field where there is greater chance for success with its attendant growth.

It may be said that in the case of pupils who fail to do satisfactory work in foreign language in the first semester, the school will expect the pupil and the home to give definite reasons why the pupil should be permitted to continue such study rather than to go into another field of work. By this means the teachers of foreign language may be able to serve better that group of pupils for whom language is most vital.

As a concrete example of the way in which this study is conducted, the following is submitted:

All students beginning the study of Latin in the Arsenal Technical Schools in February, 1925, were given, at the first of the semester, two weeks of English grammar designed especially to cover the technical grammar most vitally important in the successful study of Latin. This

included, in particular, the parts of speech, the uses of nouns and pronouns, and the properties of verbs. At the end of the two weeks a fairly comprehensive test was given on this material. On the basis of this a mark of *A*-plus, *A*, *B*, *C*, or *D* was arrived at for each student. A comparison of these marks with the students' final marks in Latin I showed the following facts:

Those marked *A*-plus, *A*, and *B* on the two weeks of English work showed such an irregular distribution of grades that no figures of significance can be derived from them except that the per cent of failure rapidly decreased with the higher English marks.

Twenty-eight of the 46 marked *C* on the English made *D* at the end of the semester or were withdrawn as failures before the end of the semester. That is to say, only 40 per cent of the *C* students in English grammar succeeded in Latin I.

Sixteen were marked *D* on the English work; of these, fifteen made *D* on the final marks or were withdrawn as failures before the end of the semester, one passed with a grade of *C*. That is to say that the *D* student in technical English grammar has practically no chance to do passing work in beginning Latin *as it is now taught*.

6. *In What Way Can a System of Essentials and Hurdles Be Used to Increase Knowledge of Technical English?*

A very significant phase of the work of the English department has been the study of English defects of pupils for the purpose of formulating specific essentials of accomplishment and habit formation in each course. As a result of this work a definite set of minimum essentials has been set up for each pupil to attain within each semester. These essentials embrace spelling, punctuation, capitalization, etc.,—those things which make or mar one's oral or written composition. Having set up these essentials, the statistical committee of the department has been keeping an accurate record of accomplishment of classes and individuals for the past four years. The marked improvement that has been made in terms of definite measures of concrete and specific accomplishment is a source of encouragement and a stimulus to further prosecution of such a policy.

Since 1921 the English department has been working to limit and intensify its teaching of technical English by giving definite lessons in formal grammar at varied intervals thru the course and by offering special opportunities for training to the strongest as well as the weakest pupils.

In English I (II*g*), English II (III*g*), and English V one-third of the time is devoted to technical English (grammar and rhetoric) with five standardized examinations or hurdles given at specific intervals to test achievement. These hurdles are prepared by a hurdle committee composed of six English teachers and are graded by statistical students (particularly capable advanced English students) under the supervision of the hurdle committee. These graders must have passed the hurdles which they are grading with a mark above 90 per cent before they are recognized as statistical students.

For those pupils who find it difficult to keep up with the average class in these courses, the English department offers double hour, double size classes in which three days each week are devoted to lesson sheets in grammar drill. In these classes capable English students become student assistants, helping the teachers with the grading of grammar papers.

A statistical report based on the hurdle results of 715 classes enrolling 18,219 pupils during six semesters, September, 1922, to June, 1925, shows an actual gain in accuracy of pupils' work as follows:

English I,	gain in class average	6.62 per cent
	gain in per cent of class passing	11.06 per cent
English II*g*,	gain in class average	8.68 per cent
	gain in per cent of class passing	12.33 per cent
English II,	gain in class average	20.66 per cent
	gain in per cent of class passing	41.02 per cent
English III*g*,	gain in class average	10.32 per cent
	gain in per cent of class passing	17.80 per cent
English V,	gain in class average	9.32 per cent
	gain in per cent of class passing	21.53 per cent

From the administrative point of view the best part of a research program within a school is the constructive spirit which it inculcates within the faculty. As evidence of this fact and as a by-product of the research program, the school now has committees at work on a number of general administrative and teaching problems which may be illustrated by the following:

(1) vocational direction; (2) the exceptional student; (3) poor spelling of good students; (4) class size; (5) use of recitation period; (6) adolescent diagnosis; (7) relative value of subject-matter within a given subject; (8) better and simpler organization.

The work which is being done by each of these committees is productive of an attitude of study of the teaching problems upon the part of every member of the faculty. A research program in education cannot presume to settle definitely the subtle issues which are inherent in the teaching process. But to establish a movement whereby teachers may shake themselves loose from the influence of tradition and custom, that they may be more ready to appreciate the way in which new phases of life make necessary new adjustment of conclusions, is to promote an attitude of mind which alone will insure educational progress.

BULLETIN OF THE SCHOOL OF EDUCATION, VOLUME I

No. 1. PROCEEDINGS OF THE HIGH SCHOOL PRINCIPALS' CONFERENCE (November 23-24, 1923)—

Address of Welcome. William Lowe Bryan, President of Indiana Universtiy.

Articulating Junior and Senior High Schools. Leonard V. Koos.

The Junior College in American Education. Leonard V. Koos.

The High School Principal: His Training, Experience, and Responsibilities. Leonard V. Koos.

Experimental Method in Determining Curriculum Content in the High School. Carl Gustave Frederick Franzén.

Credit for Extra Work, for Quality of Work, and for Out-of-School Work in Indiana High Schools. Norma L. Tielking.

Auditorium Exercises in the High School. Benjamin C. Rush.

The High School Faculty Meeting. Cecil C. Katterjohn.

Making and Administering the High School Schedule. Clarence E. Hinshaw.

The Making and Administering of a High School Schedule. L. E. Michael.

Symposium on High School Athletics. Arthur L. Trester.

The Relation of High School Athletics to the High School. Merle J. Abbett.

No. 2. INVESTIGATION OF NURSING AS A PROFESSIONAL OPPORTUNITY FOR GIRLS.

Part I. Technical Study. Part II. Vocational Information Bulletin. Florence E. Blazier.

No. 3. ELEVENTH CONFERENCE ON EDUCATIONAL MEASUREMENTS (April 18-19, 1924)—

An Experiment in Interference and Learning in Giving the Stanford Achievement Tests. Carl G. F. Franzén and Herman H. Young.

Suggestions on How to Keep Usable Permanent Records of Mental and Achievement Tests. Herman H. Young.

Measuring the Budgetary Procedure of a School System. Harold F. Clark.

Improving Comprehension Ability in Silent Reading. Grover H. Alderman.

The Advantage of Ability Grouping. Clifford Woody.

Results from Successive Repetitions of Certain Arithmetic Tests. Clifford Woody.

The Permanent Influence of the Teaching of Spelling. Clifford Woody.

Individual Development as Shown by Repeated Measurements. Walter F. Dearborn.

Reliability and Uses of Group Tests of Intelligence. Walter F. Dearborn.

Special Disability in Learning to Read. Walter F. Dearborn.

No. 4. PROCEEDINGS OF THE HIGH SCHOOL PRINCIPALS' CONFERENCE (November 14-15, 1924)—

The Culture Needed by the Men and Women of Today. J. Franklin Bobbitt.

The Objectives of Secondary Education. J. Franklin Bobbitt.

The High School Principal's Responsibility in Curriculum Construction. J. Franklin Bobbitt.

Variation in High School Cost of Instruction: Causes and Suggestions for Improvement. Hon. Benjamin J. Burris.

Determinants of Curricula for Small High Schools. Jesse E. Adams.

The Purpose and Nature of the Course in Vocational Information. Milo H. Stuart.

No. 5. FIRST REVISION OF THE BIBLIOGRAPHY OF EDUCATIONAL MEASUREMENTS.

No. 6. TWELFTH CONFERENCE ON EDUCATIONAL MEASUREMENTS (April 17-18, 1925)—

Psychological Service in the School System. Rudolf Pintner.

The Present Status of Intelligence Testing. Rudolf Pintner.

The Scoring of Group Intelligence Tests. Rudolf Pintner.

Recent Research in Vocabularies Most Needed in Adult Writing. Ernest Horn.

What Should Tests Measure? Ernest Horn.

A Study of Handwriting in Forty Indiana Cities. W. W. Black and John Dale Russell.

Suggestions on Value and Use of Accumulated Records of Group Intelligence Tests. Herman H. Young.

The Effect of Population upon Ability to Support Education. Harold F. Clark.

A Measure of the Latin Element in Thorndike's Teacher's *Word Book*. Edward Y. Lindsay.